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THE UNIVERSITY OF ALBERTA

A CASE FOR EARLY READING

BY



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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES IN PARTIAL  
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled, "A Case for Early Reading," submitted by Victor J. Muller in partial fulfillment of the requirements for the degree of Master of Education.



## Dedication...

To my daughter, Larissa, who was the inspiration behind this study. The power of this young child's mind reflected itself in her everyday activities. Piaget's studies and his international fame made me conscious of the joy of observing a burgeoning young mind and led me to exploring its potentials - not through laboratory studies, but rather through casual observations and deductive reasoning. The apparent logic of Gagné's cumulative learning theory served as the underlying premise on which I built my case for preschool reading.



## Abstract

One of the child's first tasks upon entering elementary school is to learn to read. One's ability in fulfilling this task is a prime criterion of his success or failure. Although many primary schools still operate under the assumption that youngsters begin school without any skills in reading the printed word, it is apparent that the culturally endowed child is better prepared for this task than is the child from a less enriched cultural background. The former, due to his exposure to books and to parents who read to him, is more often aware of the connection between the written and the spoken word. He has acquired a certain reading readiness. The school system is simply an extension, in a more formal and structured manner, of the learning this child receives at home. It would seem that the nature of the home environment is instrumental in the development of certain learning skills, including a basic skill to read printed words.

The past few years have witnessed an increasing awareness of the importance of early experiences on a child's development. The result has been a growing consciousness of some basic deficiencies in our educational system. If we are to capitalize on the extraordinary learning abilities of young children, emphasis must shift from secondary and post-secondary education to the primary and pre-primary levels. Environment structure looms as the critical factor in early education.



The ideal may be to have the perfect parent-teacher in every child's home. Perhaps the ideal would be a Disneyland in everyone's backyard. The ideal would be the impossible task of exposing the child, over these critical years of development, to a whole world of experiences within the structure of a well-organized whole thus assuring optimum development. Not only has modern technology revolutionized the industrial world, it is playing an increasingly significant role in education. Television has opened a doorway into practically every home. The power of this medium to promote early intellectual development has already been demonstrated by experimental studies. Furthermore the promise for the future appears even more rewarding with the imminent link-up between the family television set and the large computer centre and other such communication breakthroughs. IBM's 1500 computer system is but one example of the new generation of instructional aids which can help us in our efforts to improve our educational techniques.

A program was prepared on such a computer system to study the feasibility of promoting in young children new perceptual skills basic to reading. Ten 3-, 4-, and 5-year-old children from a local nursery took part in the program. The results suggest a new and revitalized approach to early education which may reduce a number of problems inherent in the present formal education of young children.





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## CHAPTER I

### I N T R O D U C T I O N



*Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select - doctor, lawyer, artist, merchant chief, and, yes, even beggarman and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors.*  
(Watson, 1924, p. 82)

Watson is perhaps the psychologist who came closest to arguing that environment is the only factor determining a child's development. The above quotation has long been famous for this reason. Although it may be a pretentious overstatement, one realizes however that by merely living in an environment, often without any conscious effort, the individual absorbs some of its most complex cultural attributes such as language and morality. As Staats and Staats (1963) have argued, studies which attempt to indicate negligible effects of experience on language behavior development, for example, are more than countermanded by such simple observations as the fact that children raised in France





speak French, children raised in Turkey speak Turkish, and so on. Smilanski (1968) observed that by age three many of the child's behavioral patterns are well established due to environmental influences. She contrasted the sociodramatic play habits of advantaged and disadvantaged children: each group progresses within its own structure and expands within its limits. Also the language code of the culturally deprived milieu differs dramatically from the code of the more enriched. It must be acknowledged, however, that language plays an essential role in a child's development. It serves as a necessary tool for a more organized and involved understanding of the environment. Man's ability to conceive abstract form is expressed in and complemented by language symbols. These symbols permit the development of even more abstract problems. Without them, his thinking is restricted to the most immediate and specific concrete experience. The implications for education have been expressed time and time again.

Most of education...and of miseducation as well, consists in learning verbally about things we have never observed and may never observe but which we may have to think about and take account of throughout our lives.

(Church 1961, p. 76)

Reading, an extension of language, soon becomes, in the course of a child's formal education, a prime source of informational transfer.

A meaningful exposure to written materials supplies the child with new experiences - his learning goes beyond



concrete experiences into a world restricted only by the limits of man's achievement. The child's ability to read renders him independent: his ability to gain in knowledge, insight and experience becomes primarily a function of his own desire to seek them out.

Although the child acquires speech long before grade school, reading and writing have traditionally been left for formal instruction when the child enters school. What is interesting is that despite the increased maturity of the children at this point, a number of them are seemingly unable to cope with the task of learning to read.

Virtually every intact individual acquires adequate speech behaviors, yet there are many individuals who, although they display adequate vocal behaviors are seemingly unable to learn to read, or do so only with great difficulty.

(Staats & Staats 1963, p. 136)

Is reading print such a difficult task? Are the skills required to translate the written symbols so complex? Does the problem rest in the individual attributes of the child, on the level of his acquired abilities relative to the task? Or is the problem that we have not yet found the proper learning sequence - what Gagné (1968) refers to as the 'critical path'? One need only read current publications to realize that our society is painfully aware of this shortcoming in our educational system. New instructional techniques are constantly appearing. Still no satisfactory solution exists for insuring that all children develop to



their full potential as readers. Perhaps a clue in the search for an answer to this question can be found in the quote by William Hull (which appears as an introduction to John Holt's book How Children Fail: *"If we taught children to speak, they'd never learn."*

Why must we teach children how to read the printed word? And why must this instruction be in a formal setting? Does the child not learn to interpret the complex sounds of aural language simply by interacting with them? Children really teach themselves how to 'read' the spoken language of their environment. They do not however teach themselves how to read their orthographic milieu. Raised from birth in a culture which depends essentially on speech for communication, the young child makes rapid progress in his ability to discriminate sounds and eventually to reproduce them in a meaningful context. This emphasis on language development has been reinforced over the centuries when speech was for all practical purposes the sole medium of communication. The printed word held a wealth of knowledge but was available to only a select few. As the Reformation saw the movement towards literacy of the populace, the difficulty of learning to decipher the printed page appeared paramount. Future generations succeeded, however, in breaking the task down to simpler and simpler steps until reading became the challenge of primary schools. For some reason it never got below the primary grades into kindergartens or nursery schools. The



task of learning to read must have been deemed too difficult for four and five year old children, for pre-school reading was never seriously attempted. In 1957 Durkin undertook a survey of research in this area and found that the topic of early reading "seemed to have been neglected almost to the point of total omission" (Durkin 1966, p. 9). Much evidence was put forth which claimed that even many first graders were unable to cope with the learning task. The implication was that if many six-year-olds were having trouble, it would be foolish to consider teaching even younger children. If a few had learned to read at a pre-school age such factors as 'high IQ', 'extensive parental coaching', or 'cruel forcing' were quickly put forth to explain the feat. Reading thus remained, and still remains today, an academic subject to be acquired in school under the special guidance of trained teachers.

The child is expected to acquire language skills in the home and while playing with friends. Parents teach the youngsters how to count, to know the names of one hundred and one objects and to discriminate colors. The youngsters learn quickly. They are reaching out, thirsty for new sensations and stimulation. But, as Hymes (1962) points out, the home environment does not meet the needs of our fours and fives. He talks about the "idle" and "unemployed" pre-schoolers. "They do the same things over and over, far too often" (Hymes 1962, p. 7). The emphasis in the home is on







the development of aural and visual perception within a context of concrete experiences. The child is repeatedly asked to name objects or to "tell us what you see". But although the home makes fundamental contributions in the child's development, the emphasis on certain perceptual skills carries with it the danger of ignoring others of perhaps equal or even more importance. If the child acquires speech in the home, it is a function of the structure of the home environment. Whatever additional perceptual skills are promoted in the child's early years, he usually acquires them. This is what generally distinguishes the "advantaged" from the "disadvantaged" child. The former is exposed to a more stimulating environment - to a milieu which reinforces the development of more divergent discriminatory skills. Similarly if a child is exposed to an environment more conducive to the development of reading behavior, he develops new abilities which facilitate the acquisition of reading. There is no magic age for reading. The only magic is in the learning patterns of the human brain. The child does not speak without having heard the spoken language...nor does he walk until he learns to crawl. There is a necessary foundation essential to any structure. Reading requires a foundation. If the child does not have it before school age, he will not be able to learn to read until after these prerequisite skills have been assimilated. If however we enhance perceptual development in the child and assure a solid foundation at an earlier age -



the child then will be better prepared for the next step in learning to read.

Indeed, this is the fundamental argument of this thesis. Chapter II stresses the importance the child's environment has on the development of his visual and auditory discrimination skills. The nature of our cultural endowment structures the home environment such that auditory perception is developed at a very young age. Chapter III argues that this development is not a function of a special affinity for aural stimulation - visual discrimination could be developed with equal facility. Chapter IV concludes, therefore, that many children could learn to read at a much younger age than is generally advocated - if only their environment was properly structured to ensure a good foundation on which to build this reading skill.

Of course there is the question of the advisability of early reading as well as the feasibility of manipulating the youngster's environment. These latter points are discussed in Chapter V while Chapter VI concludes this paper with the description of a technique which suggests a new approach to reading instruction. This approach takes into account new technology which will permit educationists to assess the level of "reading readiness" of each child, to structure the learning experiences to each child's ability and even to reach the child, if need be, in the privacy of the home setting. In this manner the penury of certain essential experiences in



the homes of many children can be compensated for. A whole new mode of education is promising revolutionary break-throughs into a previously sacro-sanct area - the home environment.



## CHAPTER II

### IMPORTANCE OF THE ENVIRONMENT





Reading begins with wonder at the world about us. It starts with the recognition of repeated events like thunder, lightning and rain. It starts with the seasons and the growth of things. It starts with an ache that vanished with food or water. It occurs when time is discovered. Reading begins with the management of signs of things. It begins when the mother, holding the child's hand says that a day is "beautiful" or "cold" or that the wind is "soft". Reading is "signs and portents," the flight of birds, the changing moon, the "changeless" sun and the "fixed" stars that move through the night. Reading is the practical management of the world about us.

(Jennings 1965, p. 3)

### Importance of the environment

Although the issue is no longer as spectacular nor as violent as it was some three decades ago, the heredity-environment controversy regarding the child's mental development remains a lively topic. Honzik (1965) reported findings supporting genetic factors over such environmental factors as the education level of the parents as determinants of the mental ability of the child. Despite the publication of such findings, and the even more recent study by Jensen (1967), it is generally conceded by psychologists that both hereditary



and environmental factors enter into all behavior - although efforts to determine the relative proportion of hereditary and environmental influences have had little success. The uncertainty in this area is well expressed by Hebb (1953) who states that behavior is 100 percent hereditary and 100 percent the product of environment. The current position accepted by most psychologists is well summed up by Anatasi (1965): "the nature and extent of the influence of each type of factor depend upon the contribution of the other".

Staats & Staats (1963), who advocate a behavioral approach to child development, argue, however, that one has little control over hereditary or biological deficiencies, in terms of practical implications for human behavior, while the environment can be manipulated. The same position is adopted by Fuller (1968) who summarizes: "Don't reform man, reform the environment".

Although biologists and geneticists may challenge the issue, we do not appear ready to start reforming the biological basis of human nature. We do have, however, an extensive program of research in the area of environmental evaluation. Probably the most conclusive results with respect to the environmental influence on the development of mental ability are those obtained from studies of enriched and deprived environments. Burks (1928) and Sontag et al (1958) found differences of up to 20 IQ points between identical twins reared in environments of contrasting levels of affluence.



Dennis and Najarian (1957), Newman, Freeman and Holzinger (1937), Kirk (1958), and Wheeler (1942) found differences ranging from 4 to 21.3 IQ points between children exposed to enriched and deprived environments for periods ranging from 2 to 10 years (Mosychuk, 1969).

Until recently most research was directed at measuring and identifying such global environmental factors as socio-economic status indices. These measures were based on static and material elements such as occupation or income. In discussing the under-achievers, it had been conventional to identify them as of low socio-economic background, as disadvantaged, or as culturally deprived. Fagan (1967) defined *disadvantaged* as socially, culturally, economically or educationally handicapped. Frost (1966) attributes the term disadvantaged to a "particular set of educationally associated problems arising from and residing extensively within the culture of the poor". Riessman (1962) further specifies the term *culturally deprived* to refer solely to that aspect of culture identified with the culture of the majority or, more specifically, the middle class (American) family. The term culturally deprived referred therefore to those aspects of middle-class culture such as education and formal language from which certain groups did not benefit (Riessman, 1962). Research has frequently supported the notion that children for whom the primary school years fail to form a basis for further education come to a relatively large extent from



working class environments (Rupp, 1969). The great majority of under-achievers have been identified with a poor family background. Due to this high correlation between achievement and socio-economic status, studies aimed at identifying the causes of under-achievement have often focused attention on the low economic sectors of society. The implication appeared to be that poverty was the cause of under-achievement. It still remained uncertain as to which factors in these environments were critically related to mental ability.

#### Identification of specific factors

Recent studies reveal aspects of upbringing which show a more direct connection with a child's school progress and at the same time give some indication of the conditions to which children from lower socio-economic milieux are exposed, further defining those factors influencing child development. In 1967 Jensen emphasized:

It remains now to identify those environmental factors presently thought to be most potent influences in the development of intellectual and educational potential....  
The trend has been away from crude socio-economic variables towards more subtle intra-family and interpersonal psychological variables.

(Jensen 1967, pp. 10-11)

Such an approach is not directed towards the lower socio-economic class as such, even if low achievers are to be found relatively more often within this group. An inquiry into the different backgrounds and family activities of chil-





dren with varying degrees of scholastic achievement is aimed at identifying those factors which are probably of primary influence upon school success. Under such an approach, the term environment takes on a more divergent meaning. Bloom (1964) defined the term environment as pertaining to all those conditions, forces, and external stimuli which impinge upon the individual:

We regard the environment as providing a network of forces and factors which surround, engulf and play on the individual....  
The environment is a shaping and reinforcing force which acts on the individual.

(Bloom 1964, p. 187)

Wolf (1964) conducted a study in an endeavor to relate developmental traits to variables in the child's home environment which describes "what parents do rather than what they are". The obtained correlations between such factors and the child's mental ability were much higher than those obtained in previous studies relating IQ to socio-economic indices. Although such studies date back to the twenties, the interpretation of specific behaviors in terms of the dynamic process characteristics of one's environment became popular towards the end of the fifties. Related studies include those by Pace & Stern (1958), Fraser (1959), Hoffman & Lippit (1960), Bernstein (1961), Anastasi (1966), Lowry (1968), Rupp (1969), Smilanski (1968), and Mosychuk (1969).

Rupp (1969) after an extensive study in the Netherlands came up with similar conclusions to those of other such



studies. Achievement of children even from the lowest socio-economic milieux can be distinguished on the basis of what he terms the *cultural-pedagogical* niveau of upbringing. He singles out four factors which he observed to be correlated with success:

- the extent to which the child's cognitive development is stimulated: reading to the child, playing games, providing educational toys and books, offering explanations of phenomena of interest to the child....
- the parents' involvement in the school and their children's school attendance: interest in their school reports, eagerness to establish contact with the teaching staff, reaction to the child's attitudes towards school....
- the extent to which the parents perceive positive change and development in the children, in education and in the way in which children are brought up;
- the parents' consciousness of being educators and their social consciousness (to be of influence upon....)

As soon as the cultural-pedagogical process is set in motion it becomes a system which is kept going by parents and children together (Rupp). In this sense the culturally deprived parent deprives the child. A parent's low socio-economic status often has a history dating back to school failure. His failure is now being transmitted onto his children, with all of its implications. A culture is created and passed on from generation to generation. The child born into such a setting tends to inherit its culture.

As Pines (1966) points out, it matters little academically whether or not middle class youngsters go to the existing



nursery schools and kindergartens. In either case they tend to succeed. Parental interests, knowledge, and encouragement with respect to the child's studies, as well as aspirations and expectations were found by Douglas (1964) to be a much more significant element of the environment for academic performance than other variables such as standard of the home, family size and other types of socio-economic characteristics (Mosychuk 1969).

Evidence tends to indicate that the nature of the interaction in the home determines the development of specific behaviors. A good language environment, for example, appears instrumental in promoting the development of verbal ability as well as higher ratings on verbal sections of intelligence tests (Bing 1963). In her extensive study contrasting environmental variables with the language of advantaged and disadvantaged children in Israel, Smilanski (1968) singled out several parental attitudes and behaviors (similar to those referred to in Rupp's study) which served as strong determinants of the child's language and socio-dramatic behavior. She concluded that the teaching styles of the parents and more particularly the mother induce and shape learning styles and information-processing strategies of the children. Where the one type of home environment may be very stimulating and enriching in terms of preparing a child for the future, another one may restrict his mental flexibility, ill-prepare him for rational thought, and fail



to develop proper learning techniques. Smilanski thus singles out two communication codes for styles of verbal behavior which Bernstein (1961) labels as *restricted* and *elaborate*. For example, one specific factor leading to the child's restricted language code appears to be the *status rule* behavior of the parents. Such a home setting produces a child who relates to authority rather than to rationale, who, although often compliant, is not reflective in his behavior. Development of the child's behavior is affected by such factors as the status rule.

#### Factors influencing reading achievement

If the child's early environment is of such importance on his development, the question immediately arises - what specific atmosphere or experiences are of primary importance for the development of good reading skills. Correlational studies frequently claim high relationships between reading and general scholastic ability. The implications appear to be that reading is a function of IQ or some related but difficult to define mental capacity, here again vaguely related to socio-economic background. Due to the methods of teaching reading in the primary school, language ability is invariably quoted as an essential skill which serves as a good predictor of the child's chances of success in reading. A number of recent studies, Strickland (1962), Loban (1963), and Lowry (1968), suggest however that the restricted language of the youngster is not in itself a handicap to reading







success. Although Lowry's study intended to demonstrate that the child's language background would be a decisive factor in his learning to read, he reported no relationship ( $r = .02$ ) between reading achievement and the nature of the language used in the home. The determining factors for the development of superior reading behavior appear to reside in the area of early exposure to books, to people who read, and to social and educational outings which develop in the child a desire to learn about the world around him.

A later chapter will discuss these factors more extensively. Of paramount importance to this study is the apparent nature of the prerequisites for the child's ability to learn how to read. If an elaborate language code is not an essential factor, and since the other suggested factors amount to nothing more than motivational cues for the development of necessary related skills, a new approach to pre-primary education could revolutionize the reading instruction process and compensate for the deprived child's difficulties in learning to read.

Factors in the home setting such as the 'status rule' and the 'elaborate code' are a function of the culture within the home. Efforts aimed at early childhood education will never be able to compensate completely for an inadequate language environment. New technology in the field of communication may however supplement the deprived child's experiences in the home. Sesame Street, a well-financed and



professionally staffed experimental study of television-emanating programs aimed at reaching the culturally disadvantaged pre-school child, is the forerunner of a new generation of educational efforts aimed at what now appears to be the very source of the problem: the inadequate and unstimulating home environment. Television presentations by themselves are not likely to be sufficiently influential to ensure an 'elaborate' language code for all children. But if this factor is not in itself a prerequisite for reading achievement (as the above mentioned studies suggest) and if television workshops succeed in providing the child with a wide choice and range of experiences, most any child should be able to acquire those experiences which research has shown to be related to reading achievement. A later chapter will discuss this point in more detail.

### The potential of environmental control

The promise of intervention into the child's sphere of early experiences appears to be a major step in eliminating many serious developmental shortcomings. If one could raise the cultural-pedagogical niveau of the upbringing and better structure the environmental setting, the children involved would be better able to cope with school experiences from the very beginning. In this sense, the pre-school years appear to be extremely critical in the total development of the child.



Perceptual and pre-verbal experiences are of the utmost importance in primary learning. The child builds his inmost self out of the deeply felt impressions he receives from his environment. Piaget (1963, 1967) emphasizes the child's early experiences and characterizes human intelligence as an adaptive process, whereby the organism adapts the environment to its existing system (assimilation) and adapts itself to this environment (accommodation). He describes the early ability of the infant to coordinate information from various sensory modalities and to integrate it appropriately. New schemas are established through the child's actions which stimulate what Piaget calls reproductive assimilations. It is through such assimilation that new behavior patterns are established and mastered.

Gagné (1968) stresses the cumulative aspect of this development. The child progresses from one point to the next in his development. He learns an ordered set of capabilities which build upon each other in progressive fashion. Church (1961) wrote: "The baby's experience - what he learns - is consolidated as knowledge and the most fundamental form of knowledge is the schema". He defines schema as an implicit principle by which we organize experience. Schematization occurs in the course of having one's needs attended to, being played with and talked to, and of actively exploring the environment. Church strongly advocates environmental control to assure proper development:



It is customary to say that babies, once they have gained the use of their hands and, later, their feet, have a strong 'exploratory drive'. It is probably more accurate to say that the environment exerts a strong pull on the baby. Certain objects, substances and qualities seem to be especially attractive.

(Church 1961, p. 40)

The more structured the environment, the better the control over the child's development. In the younger child and even, in many instances, in adults, perception takes the form of participation - "...where he responds organismically in an unmediated, reflex-like way to the dynamic, affective, physiognomic properties of the environment" (Church 1961, p. 49). The child, in learning to communicate, interprets this medium with affect and in a context of facial expressions, gestures, actions, and behavioral objects (Church 1961). He develops visual, tactile, auditory and other perceptual skills.

Piaget (1951) and Church (1961) stress that spoken language, that is the motor aspect of a language skill - comes only after images, or the central processes representing objects and events, have been developed out of repeated encounters with those objects and events. At a very young age, before he is one year old, the child shows an ability to interpret the complex world of aural stimuli. He is soon showing signs of understanding, of attributing meaning to the spoken language of his environment. This occurs before he is able to speak.





...passive understanding long precedes active speech...the child learns to respond to requests and cue words without specific training and without reward....

(Church 1961)

Most children are exposed to adequate aural stimuli. As a result these children all learn to discriminate aural symbolism and eventually to speak. Any disruption of the normal pattern of input creates, as will be discussed later, serious problems in the development of one's behavioral repertoire. Moreover, the process by which schemas gradually become differentiated and enlarged through discrimination would be adversely affected by any deficiency in auditory, tactile, visual, and other sensory faculties.

The environment which determines the child's experiences appears to be the prime determiner of his development. The verbal facility a child acquires is not essentially the result of his genetic endowment but largely a product of his exposure to an environment including articulate speech.

There has been considerable work done in the area of the socially deprived child, especially those from the slum areas, (Deutsch 1966, Bereiter et al 1966, Smilanski 1968, etc.) in an effort to better understand the problem of what Deutsch and his colleagues have termed the *cumulative deficit phenomenon*. This problem arises, as school achievement records reveal, in that those children who enter school with a marked developmental deficiency not only do not catch up with their middle class peers, but fall back even farther



until, by grade 5 or 6, the deprived youngster is a confirmed failure (Stevens & Orem 1968).

If environment deficiencies are at the base of this failure, our society must realize that the primary concern must reside not in a *remediation* program but in a *preventive* one. Perhaps a lesson is to be learned from the field of medicine - let's immunize our children against the environmental malady before its virus weakens the child's chances of survival in our school system.



## CHAPTER III

### NATURE OF PERCEPTION



*The first intellectual task which confronts an infant is the acquirement of spoken language. What an appalling task, the correlation of meaning with sounds! We all know that the infant does it, and that the miracle of his own achievement is explicable. But so are all miracles, and to the wise they remain miracles.*

*(Whitehead 1929, p. 27)*

### Perception: a learned skill

Fantz (1961) in The Origin of Form Perception observed that although infants practice visual discrimination right from birth, visual development appears to be highly dependent on experience and environment, dominating innate capacity and maturational concepts. He reported that monkeys raised in darkness for periods varying from one to eleven weeks had inferior performance to those not restrained from immediate visual stimulation and required proportionally more time to achieve normal responses. Fantz concluded:

The results cannot be explained by innate capacity, maturation, or learning alone. If perception were wholly innate, it would be evident without experience at any age, and visual deprivation would have no effect. If maturation were the controlling factor, younger infant animals would be inferior rather than superior to older ones with or without





visual experience. If form perception were entirely learned, the same experience would be required regardless of age and length of deprivation....

Instead there appears to be a complex interplay of innate ability, maturation, and learning in the molding of visual behavior, operating in this manner: there is a critical age for the development of a given visual response when the visual, mental and motor capacities are ready to be used and under normal circumstances will be used together. At that time the animal will either show the response without experience or will learn it readily. If the response is not 'imprinted' at the critical age for want of visual stimulus, development proceeds abnormally, without the visual component. Presented with the stimulus later on, the animal learns to respond, if he responds at all, only with extensive experience and training.

(Fantz 1961)

Hunt (1961) conducted similar experiments which confirmed earlier findings showing that all of the experimental animals reared in darkness were much inferior to normally reared animals in the original ability to discriminate a black triangle from a circle. A background of primary visual learning is apparently necessary before visual discrimination can be acquired.

Von Senden (1960) studied the learning patterns of individuals who were born blind and later recovered sight. He reported the difficulty they had recognizing even simple shapes which children normally distinguish by age six months. Even some time after gaining sight, they still depended on their other senses in identifying certain objects. 'Sets' were established based on the nature of previous learning. For example, in order to distinguish a triangle from a square



they found it necessary to count the angles, also they often found it necessary to rely on touch to identify small objects.

Experience with any normal child has demonstrated that even the very young child is capable of receiving and interpreting the aural stimuli of his environment. The same observations will also demonstrate the power of visual discrimination in the child. Early in life, while playing in the crib, the infant shows visual abilities. Fantz (1961) demonstrated that even 4-day-old infants have the ability to discriminate visual stimuli.

In language mastery maturation does not appear to be a major factor. Not that maturation may not be important in child development, but in the area of language development the infant is receptive to visual and aural stimuli from birth (Piaget 1963, 1967). By age 5 a child's vocabulary may include several thousand words (McCarthy 1954), and his sentence structure demonstrates that complex abstract relationships are already part of his repertoire of cognitive acquisitions. Nor does language mastery appear to be highly dependent on the notion of inherited intelligence. The child's language development is mainly dependent on the cultural-pedagogical milieu in which he is immersed. It is dependent on the demands of his environment. Moreover the association between sound and object requires that the child be able to perceive the object. The acuity of the child's vision and its intrinsic association with learning the aural



language of his environment becomes apparent in an observation of a parent instructing a child to "go there", to "catch the ball", or to "come here". The child's visual discrimination regarding the parent's descriptive actions which accompany the aural communication will usually be a strong reinforcer in the child's comprehension of the aural instruction.

Perception thus appears to be a directed skill. One's history of learning determines what stimuli will bring about arousal. Recognition thresholds are lowered when we have been alerted to expect stimulus-objects belonging to a certain class (Church 1961). For example, the child is reared in an environment of oral communication. He responds to it.

In the area of reading, on the other hand, there is relatively little evidence of the young child's ability to discriminate graphic symbols. Orthographic symbols play a minor role in the child's world of perception. As a result one would not expect him to respond to them. He responds to other more meaningful dimensions of his environment. Initially the child's visual perception is global; he perceives the physiognomic attribute of an object in total. Long before schools have taught the child to read he can distinguish such things as books, records and cereal boxes. As Church points out;

...it should not be supposed that physiognomic perception is inefficient or ineffective. It



has limitations...but it serves the child very well....

It is only when we scrutinize an object analytically or judgmentally or contemplatively that we cease to perceive physiognomically.

(Church 1961)

Although the young child may not have developed the analytical skills required to break a word into syllables and alphabetic characters, he is capable of developing visual discrimination at a very young age and has been known to sight-read a number of labels to which his daily activities have exposed him. Boys have been known to recognize car names while girls are more often familiar with the names of baking products (Church 1961).

#### Effects of inadequate stimulation

Children are very active in their early years. Their exposure to auditory imagery results in the acquisition of some basic speech before the age of two. In fact, by the age of six months, and often much sooner, the child gives definite signs of comprehending certain oral sounds. Rheingold, Gewirtz and Ross (1959) conducted a widely cited study using 21 three-month-old infants as subjects. They showed that even at this age verbal behavior can be operantly conditioned. Weisberg (1963) confirmed these findings, duplicating the study while using more precise experimental controls.

The young child exposed to two languages since birth acquires both without apparent difficulty or accent. This grandiose feat testifies to the early development of mental







abilities in the young child and to his keen perceptual skills. As Staats and Staats (1963) singled out, however, these skills are the result of discrimination learning through repeated exposure to adequate stimuli. The child in an English environment only learns to discriminate the sounds of the English language. The fact that he did not receive sufficient French language stimuli explains his inability in that language. A penury of English sounds would likely leave the same English child without any oral language.

Nissen (1935), in A Study of Performance Tests Given to A Group of Native African Children, reported that the native children, perfectly normal in most respects, had great difficulty in perceiving geometrical shapes and designs. Nissen concluded that their perceptual limitations were a product of cultural sets: not having been exposed to these forms, the children found them difficult to see. In certain areas of child development the general rule appears to be: the later the learned association, the weaker the link. When the brain is deprived of adequate exposure to any field of imagery beyond the sensitive stage, it becomes permanently limited both in its ability to perceive it and to express itself within it. This point of view is supported by most cotemporary psychologists including Piaget, Bruner, Staats, and Gagné. The above might suggest that early exposure to printed words and letters would aid in the acquisition and eventual mastery of reading and writing skills,



and that withholding the child from proper exposure would result in rendering letter discrimination more difficult at a later age. Is the poor reader not, perhaps, as some suggest, simply blind to orthographic presentation due to a lack of proper environmental stimuli? In simpler terms, are we not only failing to solve the reading problem but really creating it by stressing a hands-off attitude towards pre-school reading?

### Aural perception and language mastery

In terms of adults, language may be defined as a system of mutually understood, arbitrary symbols used to represent objects, actions, and their relationships. The term is often extended to mean, as in the expression 'the child's language', the child's accomplishment in learning to understand and speak the language of his culture. The tasks of correlating meaning with sounds and of acquiring skills in spoken language must be considered, however, as two distinct learning tasks. The former, of necessity, comes first: perception long precedes speech and is basic to speech development. In context of this dissertation language mastery will refer primarily to that mental process whereby the child is able to establish a comprehensive relationship between the aural stimulus and the object or idea of reference. Language mastery is not the conscious knowledge of using words but the ability to use them properly or, for the young



infant, the ability to interpret their use by others. The growth of oral language is an integral part of language mastery, as such, therefore, the distinction is not intended to support any argument that language mastery is independent of the child's acquisition of speech. For, as the child's experiences expand, he does not merely learn to understand words, he learns a whole mode of behavior, a whole linguistic, a whole culture (Church 1961).

Language is an integral part of the child's perceptual environment and plays an important role in the fulfillment of his basic needs. The child does not at first understand what words mean, he does not learn that such-and-such an object is called such-and-such, but that this thing is chair or dog or whatever (Church 1961). Ogden and Richards in The Meaning of Meaning (1949) develop this relationship between the symbol and its referent. It is only a convention and is not based on a logical construct. To the child, however, language is not perceived as a system of mutually understood, arbitrary symbols. As he uncodes the mysteries of language, he discovers a name for every object. The name is the identifying part of an object. To the child a cat is a cat because it is a cat. The name is not arbitrary. It is through the constant patterns of sounds which are consistently associated with objects and actions that children acquire language. The child has the ability to perceive the world and to react to it. However only those objects



and those properties of objects stand out which offer some relevance to the child himself, in terms of promise or threat or concrete action. Those things which are meaningless seem also to be beyond perception (Church 1961). Although aural perception is a prerequisite for active speech, it is mainly visual perception which permits the child to learn that objects exist, are distinct and can be isolated.

### Aural and visual perception - parallel skills

Walter (1953) argues that all sensory stimuli are transmitted to the brain in electro-chemical form. The central nervous system interprets the nature of the stimulus in terms of the terminal point of the nerve. Hearing is essentially a function of this nervous system. The ear is only an aural receptor. By itself it cannot translate sound waves into meaningful symbols. It can only pick up sound patterns for transmission to the brain. "There is nothing about the human ear which gives it any aptitude for language" (Stevens and Orem 1968, p. 27).

The human brain alone seems able to build up complex patterns of association between sounds, treating them as symbols representing objects, action, or even abstract concepts. The mechanics of hearing and, for that matter, talking are not therefore the essence of the language process. To the neurologist, the aural stimulus and its corresponding mental image must have a logical physical relationship.





Although Whitehead may have shrewdly said - "to the wise it remains a miracle", to the educator, a realization of the basic nature of this learning process is fundamental for the successful accomplishment of his task. An understanding of how the infant child is able to accomplish such a grandiose feat as language mastery should make one realize the powerful nature of the infant's central nervous system.

Spoken language is essentially a complex association between aural stimuli and their symbolic meaning. Yet the infant child obviously has the mental ability to perceive these complex aural stimuli and interpret this communication code. One wonders why, although he has shown refined visual perception in other fields, this child should not be able to uncode the orthographic code of written language. This basic question was raised by Gates (1954), Staats & Staats (1963), Stevens & Orem (1968) and others. The unanimous conclusion is that the environment in which we raise our children fails to supply them with adequate stimuli. Learning to see printed words is a similar task to learning to distinguish other visual forms. In order to acquire the auditory imagery of language, the child's central nervous system must have been exposed to the proper sound stimuli, permitting the structure of appropriate relationships. Similarly if the brain has sufficient exposure, under meaningful conditions, to graphic stimuli, it will master the import of the symbols (Gates 1954). Although oral language will likely always



remain the primary mode of communication resulting in the child's acquisition of oral language mastery before any other mode, this does not exclude the possible desirability of complementing the child's early environment with more visual and orthographic stimuli.

One can distinguish three stages a child must be able to master before he can put meaning into the printed word. Firstly, he must have developed sufficient visual discrimination to recognize and respond to graphic stimulation. Secondly, the child must have developed the cognitive ability to grasp the relationship between the graphic form and the object or event it symbolizes. Thirdly, the central nervous system must be able to retransform the neurological stimulus into a mental image. Staats & Staats emphasize the similarity in behavioral characteristics between response patterns to usual visual stimuli and the printed word:

Interesting comparisons may be made between the learning of verbal responses to nonverbal stimuli and the learning of those same responses to visual verbal stimuli, in other words, texting. The same principles seem to be involved in both types of learning; both are essentially problems of establishing verbal responses under stimulus control.... Ordinary language behavior requires that verbal responses be under the control of very subtle aspects of one's stimulus environment. The same thing is true of reading, that is to say, the stimuli are no more complex.

(Staats & Staats 1963, p. 136)

The dog which elicits the verbal outcry "dog" by the young child carries no special language-oriented attribute with which to aid the child in language development - no more, in



any manner, than the printed word dog. The repeated association between the object and the aural sound "dog" results in "meaning" for the child. A similar association between a printed symbol and its aural equivalent will develop a similar association which will evoke the mental image upon sight of the printed word. The learning sequence is demonstrated by many pre-schoolers who can "read" their name. This is one occasion where the printed word is repeatedly and meaningfully associated with its aural counterpart - and the child makes the association.

Besides the visual-aural paradigm, reading can be developed by a paired association of the printed word and a visual associate. This visual-visual paradigm could see the development of certain reading skills independent of any aural stimuli. The continuous pairing of two visual stimuli as shown below may well be an effective method of having printed words carry meaning to the young child.



Figure 1

If we recognize the central nature of the language learning process, there does not appear to be any grounds for supposing that the central nervous system has any special affinity to aural stimulation. To the brain, it matters not whether the



symbol-images are printed or spoken. There are no sound waves or light waves in the brain, but only patterns of neural stimulation which are differentiated in the cerebral cortex (Stevens & Orem 1968). As such, any language learning possible through one major channel must be possible through the other major sensory channels.

Gates, Anderson & Dearken, Stevens & Orem, Montessori, Skinner, Fuller and Bruner all join the chorus to insist that printed words per se are no more difficult to perceive or to distinguish than spoken words.

Much as the spoken word is but an auditory stimulus to the ear drum, written words are but patterns of light waves projected onto the receptor cells of the retina. The ensuing electro-chemical impulses to the brain (if one accepts Walter's theory) need only be recorded as a recognizable image and interpreted as a symbol with meaning beyond its perceptual image for the child to be able to read. Fagan (1970) defined reading as the process of putting meaning into a (printed) word. The definition singles out the similarity between aural and visual reading. The visual reception of words is really only one expression of a more general power of the mind, the power to think symbolically. Reading, seen in this context, is essentially the human capacity to communicate with symbols manifesting itself through the visual sensory system.







Why children do not read early

Theoretically, therefore, the child could learn to read early, perhaps before he learns to speak - much as he "reads" aural language before he can reproduce it orally. Historically, because oral language invariably precedes visual language, we assumed some neurological or biological basis. Gates (1954) argues that the main reason they learn to interpret the spoken words first is that it is more convenient for parents and others to use them than to present printed materials. One must recognize, however, significant differences in the interaction patterns leading to these two skills. In learning to discriminate and interpret aural stimuli, the child is usually interacting with another person who can, and invariably does, modify his behavior to facilitate the comprehension task. For example, speech is often, and perhaps more so in the presence of children, accompanied by marked tonal inflections and expressive actions. The mature speaker senses to some degree the extent of the child's comprehension or lack of it: he repeats or rephrases when necessary. The child, therefore, need not interpret aural stimuli in isolation - it is embodied in a context of intonations, inflections, facial expressions, descriptive actions, and other sensory qualifications.

In the presence of orthographic stimuli, on the other hand, the "reader" must modify himself totally to the rigid formality of the printed matter. He is restricted by the



number of clues he receives - the word or phrase may be accompanied by a picture, but seldomly by auditory or olfactory attributes. Moreover the printed word can only be perceived when in the reader's line of vision. Such arguments suggest that reading print must be recognized as a more difficult learning task than learning to respond to spoken language. History testifies that speech is a universal of mankind while reading is the product of a refined culture.

The reading task need not, however, be considered too difficult for the young child. The permanency (with respect to time) of the printed word and the facility with which the child's environment can be structured to assure consistency in the nature of orthographic stimulation suggest that the perceptual task can be structured and graded to the ability of the child. The main reason to suppose that most any child can learn to read before he has attained school age is his activity level generally and his ability to respond to a stimulating environment. Individual cases of early reading do not reflect exceptional children, but rather proper environmental structure. Maturation often appeared as the reason a child could not read until a later stage of development. The preceding arguments however support the notion that language is essentially a central process capable of responding to any sensory presentation, suffice that it be clear, consistent and meaningful.



We recognize the need for early exposure to aural language in the development of speech. We do not, however, appear to recognize the parallel need for just as early an exposure to orthographic language in order to promote a high level of reading proficiency. As shown earlier, visual discrimination is highly dependent on experience and environmental stimulation. Much as the blind person with form recognition, a penury of exposure to printed words during the sensitive period of the child's development may result in a serious handicap at a later date. If the child can grasp the complex relationships between sounds and meanings, argued Whitehead, how can we be so narrow as to persist in ignoring his capabilities and denying him obviously suitable intellectual stimulation.

Historically, furthermore, circumstances have it that our print is small and unstimulating to the child. This need not be the case. Small or large the written symbol has the same meaning. Only the larger print, however, can meaningfully stimulate the young child. A mass of people all speaking at once, or a lowly whisper, these are not proper aural messages to the young mind. The mother isolates the spoken words and articulates them for her infant child, she repeats them day after day and nurtures any seemingly meaningful response. Can we expect our children on the other hand, by some inexplicable work of magic, to decipher the hieroglyphics of our daily newspapers, novels, and even many of our primary



reading texts! The fact is that we do not expect them to be able to read. Perhaps it would be more accurate to say we prevent them. To quote Rosenthal (1963):

...those expecting dull performance from their subjects obtained dull performance.... Experimenter expectations and motivation were shown to be partial determinants of the results of behavioral research.

Our society really does not expect pre-schoolers to read. As a result they do not read: a self-fulfilling prophecy. The same three conditions of exposure apply to reading as for any language development: clear presentation, consistent repetition, and meaningful associations between the symbols and their referent. Failure, on the other hand, to expose the child to proper graphic stimuli during his period of sensitivity to sensory stimulation results, as Nissen, Piaget, Fantz, Von Senden, Hunt and many others have indicated, in penalizing him. By the end of this sensitive period, which many place at about the age of five, the child finds it increasingly more difficult to learn directly from the environment. The neurological schemas appear to be already developed, 'sets' are established. Thus the importance of having the basic structures to assure proper reading skills. Failing to have these schemas, the older child, in learning to read, must mediate through existing ones, the most likely being oral language. In many cases, in order to acquire the meaning of a written phrase the child appears to translate the written symbols into their oral equivalent.







The average child who develops into a poor reader usually has no problem with the same words, ideas or sentences when they are perceived aurally (Staats & Staats 1963). It is not a case of intellectual deficiency nor a cognitive problem. It is a problem of perception. It is the problem of the Africans who have trouble differentiating geometric shapes. It is the problem of the blind who has just regained sight.

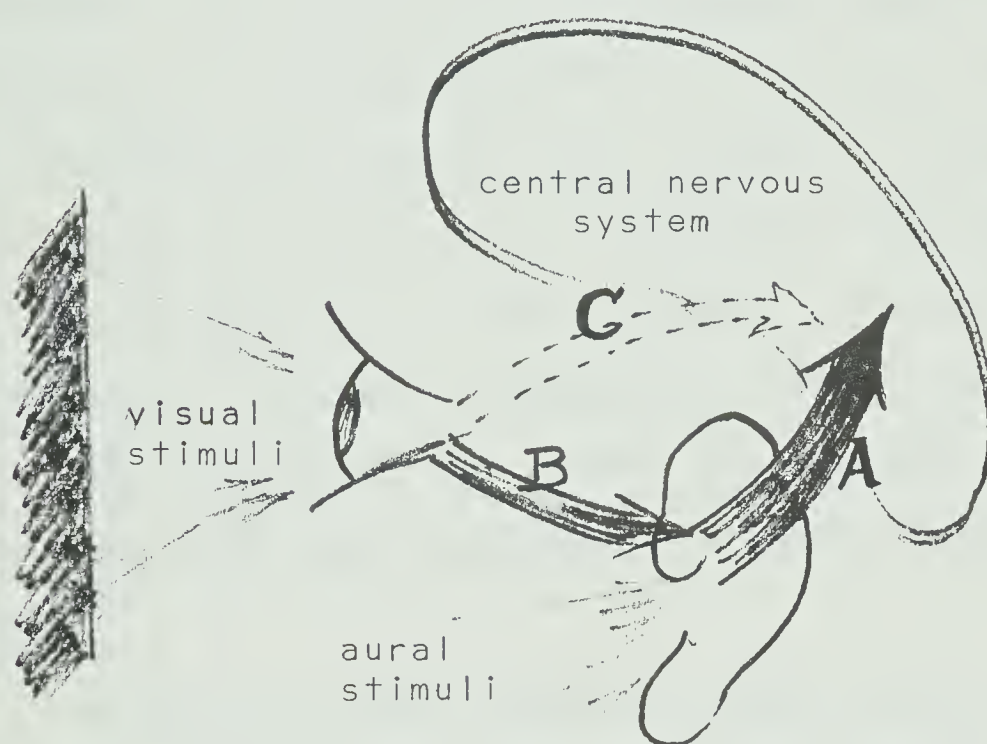


Figure 2

Figure 2 attempts to sketch this phenomenon. Path A (dark arrow) represents the aural schema developed during the early years of the child's life which results in language mastery. The medium size arrow, Path B, reflects the well developed link between aural and visual stimuli. The child's environment stressed this paradigm. Every object received an aural label. To the child the aural label is an



integral part of the object. Thus a schematic dependency is established. To establish a proper foundation for good reading, however, this dependence must be avoided. A direct route (Path C) must be assured - which requires that a primary schema be established while the child is still in his period of early development.

Could it be that many reading problems are perceptual problems? The essence of the language process consists of the ability to interpret symbols; it is the integration of the corresponding symbols into concepts. The poor reader lacks speed and accuracy in recognizing the graphic symbol, his word recognition is faulty due to a lack of familiarity and practice (Postman & Rosenzweig, 1957) and, more basically, due to the absence of the proper neurological schema which could best have been developed during the child's sensitive period.

Like practically every low-class child, most middle-class children have not learnt to read before they begin school. However, due to their more enriched environmental experiences, the culturally enriched children are usually better prepared to read. Exposure to books and parents who read to them is part of their background. The connection between the written and the spoken word is already understood by these children. Many recognize their own name in written form and can perhaps even write it themselves. Visual discrimination, if not acutely developed for word or phrase



perception, is usually atuned to the alphabetic characters. It is not surprising, therefore, that they achieve better in our elementary schools. The culturally deprived child, as a rule, does not have these experiences so essential to reading success. They are stimuli-deficient in specific areas which promote basic perceptual skills necessary for reading the printed word.



## CHAPTER IV

### PRE-SCHOOL READING: A POLEMIC





*The child makes endless questionings about the name of things, as every mother knows. He is concerned also about the printed notices, signs, titles, visiting cards, etc., that come in his way, and should be told what they "say" when he makes inquiry. It is surprising how large a stock of printed or written words a child will gradually come to recognize in this way.*

*(Huey 1908, p. 314)*

### The maturation point of view

Reading instructions have been traced back over 4000 years. There is still, however, little agreement amongst experts as to the best methods for teaching reading. The concepts of maturational process - the unfolding of innate potential - was one of the predominant theories of development relevant to the reading process. Even today there are many who still advocate such an approach. Hymes (1962, 1963), Harris (1962), Tinker and McCullough (1968) are examples of those who still explain a child's reading problems in terms of maturational factors.



Your child may be ready to read at five. Some few children are. Your child may show that he is ready at six. Some six year olds - not all, by all means - are all set to go. But your youngster may not be really eager to work with a book until he is seven or eight. Inside each of us there is a timetable. Our own personal rate of growing.... When your child is ready you will know it.

(Hymes 1963)

Tinker and McCullough (1968) stress a minimal mental age for successful reading instruction as defined in the school situation and also require a certain stage of intellectual maturity, emotional adjustment, certain attitudes and considerable verbal facility in oral communication. In this sense, reading readiness usually refers to the attainment of a level of development suitable for profitable classroom instruction. In many schools if the child does not show sufficient skills on specific reading readiness tests, he is considered incapable of benefitting from reading instruction. Kindergartens and reading readiness programs all too often stress unrelated skills and fail to recognize the child's abilities in the area of reading. Chall (1967) reports:

It is important to note here that the usual, conventional reading-readiness materials give practice in interpreting pictures, in speaking, and in observing similarities and differences in pictures and some geometric forms, but *no* instruction in identifying the letters of the alphabet.

(Chall 1967, p. 154)

The belief is that the child is not to be given 'any' directed material until formal schooling. Even kindergartens within school systems often refrain from teaching the alphabet or word-recognition skills. The notion still persists that the



child is not 'ready' for reading until he enters the first grade of our elementary school system, and even then that he may not have matured sufficiently to effectively undertake reading instruction.

This concept dates back to the turn of the century, with Hall's theory which stressed the predetermined nature of man's growth 'which unfolds in stages'. Gesell (1925, 1928) followed suit; he and his students strongly emphasized the importance of the normative data supporting the maturational concept - he measured average developmental ages of specific behavior, explaining these stages in terms of "intrinsic growth" and "neural ripening". Throughout the 1920's and 1930's the progressive education movement became very popular fed by Gesell's continued fame and such studies as those by Thorndike (1923), Coghill (1929) and McGraw (1935), the latter a study of twins which claimed to have demonstrated that 'neural ripening' remained uninfluenced by environmental factors.

The general atmosphere was very receptive therefore to the Morphett-Washburne study (1931) which recommended a mental age of 6.5 as a prerequisite for successful reading instruction. The quality and applicability of the study was accepted without question, in contrast to the reception of the National Society for the Study of Education's (NSSE) recommendation in 1925 for reading preparation programs at the kindergarten level and at the beginning of the first



grade. NSSE's concern for the high rate of first grade failures due to reading problems attributed the cause of this problem to the lack of early experiences with a reading-oriented environment. Similarly, Watson's extreme environmental position was contrary to the popular current and had little effect on education at the time. As early as 1908 Huey was arguing for environmental structure in the home to facilitate the development of reading skills. Gates however was perhaps the most influential of the critics of the popular movement. His studies (1939) questioned the predictive value of the then popular readiness tests and were critical of the reading instruction techniques of his time. He reported:

The optimum time of beginning reading is not entirely dependent upon the nature of the child himself, but it is in a large measure determined by the nature of the reading program.

(Gates 1936)

Despite the reports of more and more cases of successful early reading instruction (Davidson 1931, Brown 1924, Terman 1918, Wilson and Flemming 1938, Almy 1949), the current remained strong as reading readiness, maturation, and the assessment of readiness by means of reading readiness tests continued to dominate the literature as well as the minds of educators throughout the '40's and '50's. Gesell was the 'hero' of those two decades amidst such popular figures as Olson and Havighurst. Their arguments followed a trend; for example, the Carter experiment (1949), based on a longitudinal study





of 100 children entering the first grade, 50 under the age of six and 50 over six, reported that 87% of the younger children did not achieve as well as the others. The implication was that in most of the latter cases it may be advantageous to begin school a few months later.

The trend still exists in current literature. Tinker and McCullough claim that from 25% to 75% of the children starting in grade one are not ready to begin reading. They report that a minimum mental age of six years and four months is necessary for success in first-grade reading. Harris (1962) supported a minimum mental age of six. He drew up a table of corresponding suitable chronological ages for undertaking reading instructions:

CHRONOLOGICAL AGES AT WHICH CHILDREN OF DIFFERENT IQ'S  
REACH A MENTAL AGE OF SIX YEARS

| <u>IQ</u> | <u>Chronological Age</u> |        | <u>Place in Population</u>                |
|-----------|--------------------------|--------|---|
| 130       | 4 yrs.                   | 8 mos. | about 25% of the children                 |
| 125       | 4                        | 10     |   |
| 120       | 5                        | 0      |   |
| 115       | 5                        | 3      |   |
| 110       | 5                        | 6      | about 50% of the children                 |
| 105       | 5                        | 9      |   |
| 100       | 6                        | 0      |   |
| 95        | 6                        | 4      |   |
| 90        | 6                        | 8      |   |
| 85        | 7                        | 1      | about 25% of children have<br>IQ below 90 |
| 80        | 7                        | 6      |   |
| 75        | 8                        | 0      |   |
| 70        | 8                        | 7      |   |

Harris, Effective Teaching of Reading, p. 24.



### A dilemma

If one were to base himself on Tinker's criterion and extrapolate from Harris' table, one would conclude that, for better than fifty percent of the cases, grade one is too soon to start teaching reading; it would have to be postponed until possibly the second year and even in some cases the third or fourth.

Advocates of the notion of reading readiness stress the importance of five major factors:

- sufficient level of intelligence
- a basic amount and kind of previous learning including basic perceptual skills
- good health
- an adequate level of speech development
- personal and social adjustment

which make it possible for the child to progress in his reading achievement at a normal rate when exposed to good classroom teaching. Although all these factors are relevant to some degree, they do not appear to justify the deduction of a specific minimum mental age for beginning reading instruction. Most studies (Nicholson 1958, Olson 1958, Gavel 1958, and Durrell 1958) have shown a very low or even a negative correlation between measured mental age and beginning reading achievement as well as between mental age and letter- and word-perception skills. A low correlation found between reading and language skills was reported earlier.



Furthermore, the major arguments supporting a 6-plus age factor are based on correlational studies showing that younger students do not cope as well as older students with the reading programs as they exist in the schools. Erroneous conclusions were drawn from these studies. It was assumed that the deficiency found in slow readers was primarily a function of maturation and gross mental, physical and emotional development. The rationale appeared irrefutable - it became an accepted "fact" that children could not be "taught" to read before school age except under exceptional circumstances. Until recently few studies had revealed the importance of those specific factors within the learning situation which may be even more relevant in determining the failure rate of young beginning readers like the teaching style of elementary school teachers, the textbooks used, the type of upbringing the child received, and, perhaps most significant, the current belief in the magic age of six or six-plus.

The child entering the first grade is too young to read, claims psychologists such as Tinker & McCullough. Further arguments supporting this stand estimate that 25-35% of first-graders are not promoted at the end of the term due, by and large, to their weakness in reading skills (Betts 1957). Gates (1951) claims that 99% of grade one failures are due to reading, as well as 90% of second grade failures and 70% of third grade.



Time and further education however do not appear to solve the problem. Following are estimates of the seriousness of the reading problem by various people knowledgeable in the area of reading, learning, or child development:

Gray (1956) claims 20-30% of junior and senior high school students have problems reading books ordinarily used at their respective grade levels.

Conant (1961) witnessed high schools where as many as 30% of the students were rated below the sixth grade level in reading achievement.

Witty (1956) estimates that one-third of all high school students fall below the eighth grade level in reading.

The Council for Basic Education (1961 report) estimated that 75% of the total school population was reading below their proper grade level.

Gray (1956) further claims that as many as 50% of the adults are unable to read sufficiently well to keep abreast of current social and political issues.

If reading readiness is a question of maturation, one wonders at what age this ability unfolds itself. By the above reports, it appears as though we may have to postpone reading training until sometimes during adulthood.

### Children can learn to read at a young age

Whether or not a child has any capability to learn to read at an early age, he has little opportunity to employ it. Not only do the home and environment make little effort to provide the child with visual language experiences comparable to his aural language experiences, many parents and educators often consciously refrain themselves from exposing him to the printed word. Following a newspaper report on the





findings of her California Study (1958-1964), Durkin received the following letter from a Mid-Western parent. In Durkin's words, "the content summarizes very accurately the concern expressed in 1958 in most of the California interviews" (which she conducted while studying the backgrounds of pre-school readers).

My first child I completely discouraged from reading before he was taught in school. My second child learned to read while in kindergarten but the teacher informed me not to encourage it. Now my 4½ year old son has started reading. How he learned I'm not quite sure; one morning he was sitting there reading different words. I took the book later and sort of hid it. He found it again and, as you say, they are persistent.

You hit the nail on the head when you said they are curious, persistent, and perfectionistic. I had considered these bad personality characteristics and figured he is mentally ready for school but not emotionally. My husband and I try to encourage learning and we had discouraged reading but now I'll get him books from the library if he wants them and will forget what people say, and they have said plenty. Incidentally, the two older children say they didn't help him.

Thank you very much and I will keep your article for all the critics, especially my sisters-in-law who also happen to be school teachers.

(Durkin 1966, p. 56)

It was suggested above that the process of learning to 'read' aural language was a neural process of essentially the same nature as the transformation of printed symbols into meaningful neural patterns. The main reasons why children do not learn to read early and as 'naturally' as they acquire language comprehension and speech skills can be summarized as follows:



- *every object has a spoken tag* - no such impression is given to the child regarding graphic symbols,
- *whatever print is around the home, it is not suitable for child stimulation*, we are in a sense keeping reading a secret from the child by always having such small print,
- the conditions of meaningful association and repetition, so prominent in the child's world of aural language, are unfulfilled,
- parents are not usually conscious of the child's initial 'reading' responses and, therefore, *fail to reinforce early reading behavior*,
- parents assume pre-schoolers cannot learn to read and, in many cases, *intentionally refrain* from encouraging reading development.

"Whatever secondary factors may be involved, the main reason why children do not master symbols is that none of the conditions of learning are presently fulfilled in their environment" (Stevens & Orem, p. 38). There is no recognition of the child's real learning capacity. We unconsciously assume the child cannot learn to read much as we unconsciously assume he will learn to talk and walk. As a result, most children are not 'ready' until after exposure to grade school where, finally, they are inundated with written symbols and expected to learn to read like so many kernels of instant popcorn.

Was it Pines (1966) who said that reading readiness was really nothing more than the person's (parent or teacher) readiness to begin teaching the child to read? Children do have the aptitude for early reading. History reports a number of successful cases where interested people have taught quite young children how to read using a number of techniques.



Terman (1918) reports the case of a young child exposed to a stimulating program which resulted in early reading. Similarly Stevens & Orem (1968) describe how Winifred Stoner consciously provided her daughter with an enriched and directed environment: with the expressed objective of promoting early reading; her daughter did learn to read at a very young age. Fowler (1962) conducted a study which promoted early reading with two three-year-olds, one with an IQ estimated at 140 and the other at 91, demonstrating that intelligence was not the determining factor in the capability of young children to learn to read. Moore (1960) using his well-known "Talking-Typewriter" technique has successfully promoted reading skills in a large number of kindergarten children. John Stuart Mill, in his Autobiography recounts the early education he received from his father. At age 3 he was learning mathematics and the Greek language. At 8 he took up Latin, 'was soon reading (the original) Greek and Latin Classics' and developed a keen interest in reading history as well as writing about historical periods. At age 12 he began studying Aristotle and Plato.

The rate of learning to read seems to relate more closely to one's background in such perceptual skills as graphic discrimination than to mental age. Most cases of early reading have a history of early exposure to the realization that books contain hieroglyphics which can be translated into meaningful aural language. The remedy for lack of



reading readiness appears to be to expose the child to specific experiences directly related to reading rather than waiting until he is *ready*.

### The starting place: the home

The serious problem of poor readers cannot be faulted on the child's inability to learn to read, nor is the problem altogether due to our primary school instructional techniques. The problem lies in our society's failure to realize the power of the child's language development process.

Early training in the reading process must occur in the home or at the nursery schools while the child is still in his sensitive stage of development. Some of the best-known private schools in England who enrol 5-year-old children will not, according to Fries (1962), accept those who cannot already read. In fact Fries wrote a reading primer for 3 year olds.

Throughout her years of work with young children, Montessori (1964, 1966a, 1966b, 1967) developed a theory of child development which supports this notion of early reading ability. The following are some of the major points in her philosophy which are relevant to this study:

- the child has prolonged sensitive period, lasting almost to the age of five. This period is a stage during which the child's brain has a "a truly prodigious capacity for possessing itself of the images of its environment";







- contrary to our prejudices, children will demonstrate unforeseen learning capacities if they are given the opportunity and proper environmental conditions;
- once a child's imagination or interest is captivated, he will spend hours on end, without apparent fatigue, exploring, manipulating, absorbing the object or situation at hand. There are "explosions" of interest for knowledge or skills in certain areas; she speaks of "explosion into language" and reports that children may be occupied for 7 or 8 days with the same task. One mustn't 'bore' the child by taking him away from an engrossing activity;
- the notion of protecting the child from mental stress and precocious intellectual activities is based on cultural prejudices which are essentially unfounded. Not only will children acquire a perfection in their undertakings which would be difficult to match at a later stage of development, but they will often carry with it an enthusiasm which is rarely found in later learning. "Intellectual exercise is the most pleasing of all to the small child".
- the nature of our modern primary school structure does not recognize the nature of the learning process in the young child. The restricted school setting imposes an artificial schedule of learning, fails to recognize the needs of the slow learner and seriously restrains the potential of the more widely experienced 'superior' child.

Montessori emphatically maintains that "the child makes himself out of the elements of his environment". Although she lacked scientific rigor to support her theories, Chall's (1967) overview of research in the area of reading substantiates many of her claims and cites a number of studies supporting the notion of early child ability to discriminate letters and to learn to read.

The incongruity between the average person's speech ability and reading ability, supported by the seriousness



of the rate of reading failures throughout the school period as well as the apparent weakness in reading skills of the adult population in general, all these arguments tend to support the thesis that not only must reading begin with improved home instructional settings, but that the failure to properly stimulate the child's interest in orthographic relationships during his period of developmental sensitivity may jeopardize the child's whole future reading ability.

In stressing the maturation concept regarding reading readiness, many educators assured parents that if they waited patiently the child would eventually achieve reading readiness and begin to learn to read "naturally" and easily. Current studies appear to indicate, however, that the longer the delay, the more serious the problem. As a result the elementary school teachers become overburdened with other wise normal children who cannot read and show little sign of ever being ready.

The popular notion of reading readiness which has obscured the teaching of reading for some years is, in fact, a misunderstanding which developed as the result of inaccurate cultural assumptions. There is no 'reading' readiness in the child, only a language readiness. This language readiness begins to function sometime in the first year of life.

(Stevens & Orem 1968, p. 75)

The primary school child, if deprived of proper visual language stimuli during his more sensitive period will likely encounter a number of problems - the following are a few which current research have identified:



- his 'brain' is no longer as 'plastic' and as receptive as it was: he no longer is able to receive new forms 'automatically', by necessity he must rely upon existing auditory images as mediators,
- he must now labor to imprint on his brain each minute and complex relationship. The printed words are as a foreign language would be; each symbol must be referred to a different and inherent referent which has been previously acquired - usually to one's native language, verbal speech,
- repetition and rote learning no longer satisfy the young school-aged child; he has progressed into the arena of relationship analysis,
- reading is forced onto the child (at this difficult stage) under artificial environmental conditions to which he is just learning to adjust (that alone is a major and demanding task) with the ominous danger of frustration and a growing dislike for the school as a whole.

But learning to read could be acquired gradually and enthusiastically by the preschooler who is exposed to a stimulating environment at an age when he is rapidly and eagerly absorbing the environmental cues. For this young child, sight recognition and word association would be most natural. Even decoding the complex system of words and letters does not appear to be a problem. Downing (1962) found that 4-year-olds had no more trouble learning to read using i.t.a. than did 5-year-olds. Exposed to adequate stimuli young enough, the child will likely learn to read regardless of the technique used.

Recent research in primary schools supports to a great extent the phonetic or linguistic approaches to reading instruction. The child, having mastered oral language, is



encouraged to use this skill as a mediator for interpreting printed material. The written symbol is translated into its corresponding oral symbol which, then, is readily interpreted by the central nervous system. This is a technique which caters to the child's 'set': reading is taught using oral language as a mediator. Early reading training on the other hand would permit the child to translate directly from the orthographic symbol. The need to 'vocalize' would be reduced; speed, accuracy and, therefore, interest would likely increase.





## CHAPTER V

### TOWARDS A SOLUTION



*Waiting until age six and then being taught ineffectively often proves disastrous for the children of poverty. Since they do poorly on first-grade reading readiness tests - perhaps the most class-bound test in existence - they sink to the bottom of the class right from the start.... From then on they may never catch up. They cannot compete with their middle-class schoolmates; they cannot please their teachers; they cannot begin to cope with what is expected of them.*  
(Pines 1966, p. 200)

### Desirability of early reading

Because efficient reading is probably the most important skill required in the educational process in secondary and post-secondary instruction, the poor reading performance of millions of children is a just cause for concern. In our modern technology, the transfer of information relies more and more on the printed language. The task of maximizing the intellectual potential of our children has acquired new urgency. The rapidly expanding role of technology, now taking the form of automation, decreases opportunity for persons of limited competence and skills while it increases opportunity for those competent in the use of written language, in



mathematics and in problem solving (Hunt 1964). Hunt also emphasizes the challenge of eliminating racial discrimination which requires not only equality of employment opportunities and social recognition for persons of equal competence, but also an equalization of the opportunity to develop that intellectual capacity and skill upon which competence is based.

More so today than at any other time in history we realize that any one man can produce but a fraction of the knowledge, techniques and values which comprise the cultural endowment of his society and of mankind (Bruner 1965). Korzybski was quoted as saying (Stevens & Orem 1968): with language man escapes at least some of the bonds of mortality in preserving for posterity his wisdom". Those characteristics which make a person a human being are largely a product of his early exposure to the values and concepts contained in the symbolic heritage of his culture (Stevens & Orem 1968). This achievement is greatly indebted to man's ability to duplicate even abstract ideas onto paper, for the written language alone has been consistently true to human achievement, free from distortions, and guarded against the frivolities of man's memory.

Although the ultimate task may be to teach as many as possible to read as efficiently as possible, one purpose of early exposure to reading-oriented materials is to assure the child the experience of the *self-thrill of learning with*



*success* rather than the possible frustration of failure in the primary grades. Fuller suggests that the inner satisfaction from learning to read at an early age is a powerful and dynamic force that will effect the whole future of a child.

As Hunt demonstrated in his studies of animal behavior, environmental deprivations can have permanent deleterious effects on future development. Bloom (1964) claims that the environment has its greatest influence on a human characteristic - such as intelligence - during the period of time in which the characteristic is undergoing its greatest rate of growth or change. In his estimation 50% of the child's total capacity to develop its IQ is realized by age 4, and 80% by age 8.

These are all arguments favoring early exposure to directed reading material. Conant maintains that once at the junior high school level a poor reader is probably too advanced in his development for remediation to be of any significant usefulness. Others suggest that even a third grade poor reader is probably too advanced for normal remediation to be effective. Moore (1966) and Worth (1966) recommend a reversal in our present educational structure with the emphasis on the parents and nursery teachers rather than the university professors.

If we wish to prepare our children for a future of achievement and success, the first tool they need is oral





language, the second tool, in terms of scholastic aids, is a sufficient ability to read.

In his doctoral dissertation which studies the backgrounds of the 50 most highly rated readers on a college reading entrance exam, Kasdon (1958) reports that 54% indicated they had learned to read before entering the first grade while 18% could not remember whether or not they had pre-school reading skills. Terman's study (1918) of gifted children reports similar results favoring early readers. These studies are all the more impressive when one realizes the relative scarcity of pre-school readers in the first place. Durkin (1966) conducted several longitudinal studies on pre-school readers as they progressed through the school system. One of the most significant findings common to all three of her studies was the inverse association between the intelligence level of the early reader and the quantitative advantage of his early start in reading. A tacit but powerful force against early reading resides in the fear by many schools that they could not effectively cope with the wide range of abilities which would result. They cannot motivate too advanced students and often find that they disrupt the classroom. A further argument claims that non-pre-school readers soon catch up and that, therefore, it isn't worth all the trouble to teach them before school age. One hundred and one arguments however can be presented to refute these points. Perhaps the most realistic is the one given by Stevens & Orem:



Whatever some persons may say about the 'dangers' of early reading, they will find it difficult not to admit that it is the non-reader or poor reader who is the problem. It is certainly not the child who reads easily and well who suffers in school, but the unfortunate student who cannot seem to make sense out of the printed words that constitute the path of learning. Academic deficiencies stem more frequently from 'failure' to read well, than from 'ability to read'.

(Stevens & Orem 1968, p. 118)

The slow learner and the less bright child are most in need of any new technique and experience which would facilitate the learning tasks encountered in school as well as in his natural development. The acquisition of reading offers the child a whole new world of experiences to be found on the printed page and, no longer having to struggle with the reading task, allows him to devote much more time to other areas of scholastic achievement. With the additional time and the added experiences acquired through the acquisition of reading as well as the more meaningful experiences gained by his readings, the young child's chances of enjoyment and success in school are greatly enhanced. It is in this sense that Durkin found lower IQ students to benefit most from their early reading ability.

Early reading instruction appears, if one evaluates the results of a number of similar experiments, to have a positive measurable effect though not always continuing through the years (Durkin 1966, McKee, McCowen and Harrison 1947, Worth 1966). The school's inability to cultivate the accelerated learning skills of early readers, in fact the



tendencies to be annoyed by too advanced, "disruptive" students is likely a factor in this early superiority not being maintained or even widened. Much injustice has been done to both the advanced students and the slow learners. Although we have been aware of individual differences for a long time, we have concentrated our efforts on minimizing them. We have done our job well, so well in fact that many students ridicule differences in others and fear or are ashamed of being different from the group.

The extent of these individual differences are far greater than was first expected. Be it due to religious conviction in man's equality or some philosophical belief, the result has been an unexamined assumption about the biological nature of man. Recent research has proven otherwise. In fact a biologist, Williams (1958), tells us that human nature cannot possibly make sense unless we begin with individuality. Studies in perception have been telling us all along that what we see depends upon what we are prepared to see - and in no two individuals is this "preparedness" the same. Not that the environment does not have a definite influence on individual development. But no two environments are the same, and a good environment is essential if children are to develop fully. Structuring the child's environment to promote early and more harmonious development is not an effort for equality in excellence, but to permit each individual to become an independent and striving self.





Simple exposure to reading material and basic reading instruction at the kindergarten level appears to significantly facilitate the child's initial gains in first-grade reading, comprehension and vocabulary skills. If the schools can meet the challenge that these children present, pre-school readers' initial advantage over non-readers cannot but have a long term effect, maintaining and even increasing their superiority in reading skills over the years. Learning is cumulative. The more one has, the more one benefits from each new experience. A study of the effects of Sesame Street (1969) confirms this theory. The study was conducted by the producers of the program shortly after it began broadcasting. A control group consisted of non-viewers while the experimental group consisted of those who observed the program. Aimed at exposing culturally deprived children to new facets of the world they live in as well as its language and mores in the hope of narrowing the gap between the culturally disadvantaged and the more advantaged children, the program only served to widen the difference. Not that the disadvantaged child did not benefit from the experience, but the culturally enriched child, with his more experienced background, benefitted even more.

The suggestion of giving a kind of structured reading instruction to 5-year-olds will find fewer objections today than at any other time in recent history. It is a curious experience, nonetheless, to observe the reaction of many to the suggestion of teaching 2- and 3-year-olds. However, in





the words of Gagné:

If growth is the dominant theme, educational events are designed to wait until the child is ready for learning. In contrast, if learning is a dominant emphasis, the years are to be filled with systematically planned events of learning, and there is virtually no waiting except for the time required to bring about such changes.

(Gagné 1968, p. 178)

This is not an open invitation to putting youngsters behind desks or into formal school settings. It is a challenge to supply the child with a highly informal and yet a well-structured environment in which the child's own initiative and interests will result in the acquisition of a wider range of skills - many of which will greatly facilitate his future development within a school structure.

### Feasibility of early reading programs

Are we going to do anything about the new insights we have concerning the importance of the child's early years? Although we are doing something, the change is not as drastic as some may like it to be. But that is probably because there is no single approach that will solve the problem. What is needed is a revolution in the present educational outlook. Focus must shift to the young child; more resources must be put into early verbal development (Schaefer 1965), more attention must be given to understanding the growth of the young mind.

If we put enough energy, manpower, imagination, and money into it - if we dare go ahead - we can probably make the next generation of human beings far more intelligent than any that came before it.

(Pines 1966, p. 220)



Efforts to promote earlier education on a large scale have been faced with two major hurdles. Firstly, if nursery schools and kindergartens are to be established which will offer *proper* experiences and learning environments, the cost of obtaining the physical facilities and the trained staff, even where available, is often prohibitive. Pines (1966) talks of Children's Houses on every block and a network of home tutors; she also mentions Rambusch's nursery-mats, "as informal and accessible as a neighborhood laundromat". Head Start tried reaching pre-schoolers in slum and low-income areas. Invariably the cost is high, administration difficult, and results, even if often encouraging, limited to a small number of children.

The second hurdle advocates of early education must face is the sanctity of the home. Not only do we find parents who cannot bring their children to a day care centre, there are many, and unfortunately perhaps their children are most in need of it, who simply are not sufficiently concerned to bring their youngsters to such a centre. There are those who dislike the educational system or mistrust it. To expect these parents to attend programs aimed at improving their pedagogical ability and stimulating interest in their children's mental growth is to be contradictory. We are trying to reach 2- and 3-year-olds because, we argue, waiting until grade school may be too late for proper development of certain behaviors - and then we expect to start by changing adult behavior!



These are only a few of the problems faced by early reformers. They frequently have neither governmental, parental, nor, in many cases, educational support. However no parent would refuse to let his child acquire more skills and to learn to read at a young age if (i) the cost was reasonable, (ii) the program did not detract from the child's normal physical and intellectual development (i.e. the program complimented rather than supplemented his current development), (iii) the program did not require that the child attend a special establishment away from home (the instruction could take place in the home as well as in nurseries and other such settings) thereby eliminating fears and prejudices in the mind of the parent as to the nature of the instruction for they could follow the program with their children, (iv) the child were to enjoy the learning experience, (v) it would assure a smoother transition into the formal school setting and reduce the dangers of frustrations and failures. In fact, if such a program were available and if educators supported the movement, parents would soon be eagerly demanding it.

*Modern technology is promising just such a breakthrough.*

### The promise of the future

The promise appears to lie in the imminent link-up of the family television set with large computer storage centers. Sesame Street testifies to the powerful and far-reaching



waves of the television screen. Not only do its statistics show that nearly every home has a set and that pre-schoolers are avid viewers, but also that a well-designed program can result in substantial increases in specific skills.

Television does have its limitations, however, namely, that a station can emit only one specific program at any one time and, therefore, does not lend itself to individualized instruction. Moreover, if the programs are sequential, a child who is absent for any length of time cannot return to the point in the program where he last left off. Furthermore, a good sequential program too difficult for a young child at one point in time tends to continue to be too difficult, for as the child grows mentally so does the program advance in complexity. This is where a hook-up with a computer center can add great flexibility to the television. The large memory cores available with computers permit such complex feats as individual performance records and a wide choice of programs. Any stored program could be dialed, turned-on or turned-off at will. Upon sign-on, the program commences at the point at which the person last signed off. Through interaction devices, the viewer's rate of progress is monitored and the program is altered to suit the pace of the viewer.

The technology for such a system is currently available. Efforts are now going into devising systems which will render such techniques economically feasible for the individual homeowner.







The new revolution in education is coming faster than we may expect. A challenge is being offered to all teachers and educators who will be called upon to assist in the development of quality instructional programs.



## CHAPTER VI

### AN EXPERIMENTAL STUDY



*In our time, the role of the school has shifted from that of selecting a small percent of the pupils for more advanced education while the others dropped out and went to work to that of reaching every child effectively to enable him to go on.... The task...is no longer to find the favored few but to identify a wide range of potential talents and to help each student to achieve his potential, both for his own self-realization and to meet the ever increasing demands of a complex technological society.*

*(Tyler 1969)*

### An outline

As technology is linking the audio and visual sophistication of television to the intricate complexities and resources of computers, a new instructional device of great promise is making its way into the field of education. Since perhaps the greatest breakthroughs in pre-school education involves television programs emitted into the home (Sesame Street), and since individualized instruction is gaining favor as a method of instruction, an individualized program for pre-school children was prepared using the IBM 1500 computer facilities in the Division of Educational Research. The program was organized so that the children were presented gradually more complex perceptual tasks. This was done with



the aim of developing in the young children a level of visual discrimination which would permit them to identify certain written words and to recognize them as labels or symbols for their correct pictorial referents.

As in all individualized programs, each child's response pattern determined the sequence of the instructional material to be displayed and the required responses. The program was designed to select an order of presentation most likely to result in the rapid attainment of the objectives stated above (see flow chart, page 78).

In November, 1970, a group of ten children from Happy Tot Kindergarten and Day Care Center were brought to the University to take part in this study aimed at demonstrating the feasibility of teaching pre-schoolers perceptual skills leading to basic sight reading - i.e. the correct identification of words in isolation.

Children today are raised in an environment which reflects our age of sophisticated technological advancement. Buttons beckon elevator carriages and candy bars; the ring of the telephone warns of someone on the line; the turn of a knob results in the TV set emitting colorful moving pictures and sounds. Even the play objects we give our children serve as an initiation to this sophistication. Dolls splash water, dance or crawl. Toy dogs and bears move in whirling gyrations. This is the world of today's children and they take it for granted.





It was no wonder, therefore, that these three-, four-, and five-year-olds related well not only with the curriculum material of a computer-based program but with the apparatus itself much as they would with their so-called 'toys'. The picture below is a photograph of one of the children sitting at a computer terminal.



Beginning with a programmed Peabody-type test to ascertain at least a minimum ability to discriminate pictorial material, the program proceeded to develop the one-to-one relationship between the printed word and its pictorial referent (object). In an effort to assure a higher degree of motivation, the child was permitted to choose the



objects (and therefore the words) he wished to explore from sets of four which were presented to him on the Cathode Ray Tube (CRT) - a TV screen which is an integral part of the IBM 1500 terminals (refer to photograph below). Here the child points with a stylus to one of the four objects on the



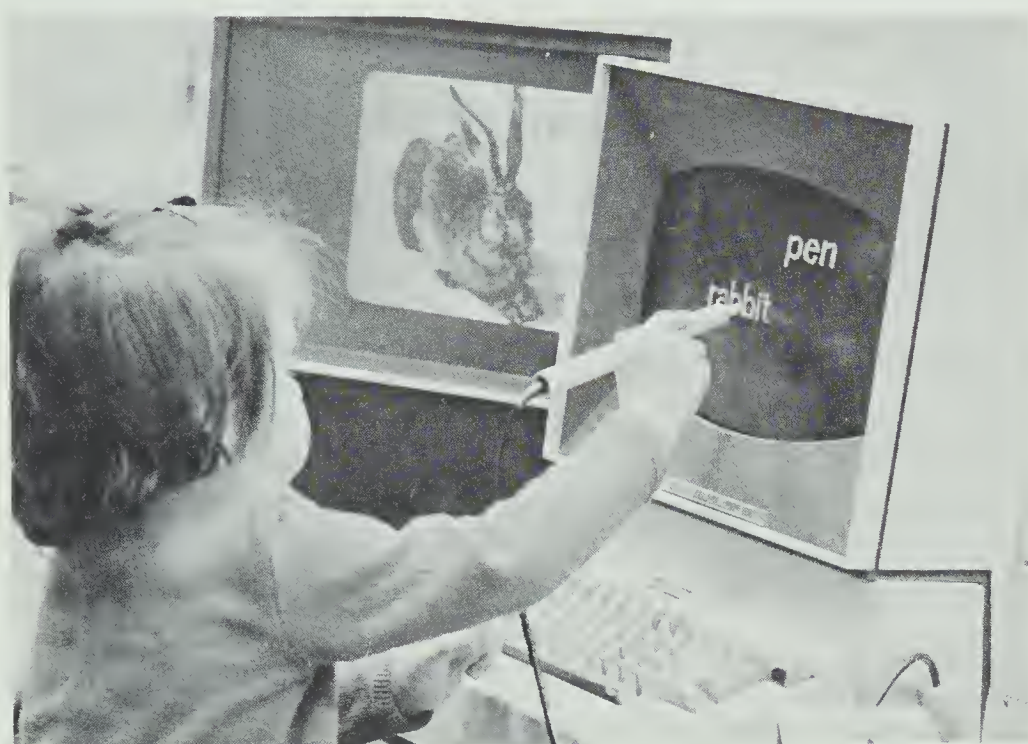
CRT. The stylus is a pen-like device which is sensitive to the light on the CRT. It identifies the coordinates of the area to which the child has pointed. In response to the child's choice, a colorful slide of the object appears on Image Projector. In

selecting the slides for the program, an effort was made to choose those which represented the object in a realistic setting; for example, a horse in a pasture, or children running with a pail. A list of the 40 words appear in the appendix. The correct word representing the name of the object under study appears on each slide. The child then receives an audio message which identifies and stresses the word-object relationship. The child is challenged to identify the printed word appearing on the CRT. The task goes from one-option





matching to a two-option and eventually to a four-option task, determined by the child's level of achievement. The one-option task (in which the child must point to the only word on the screen) is aimed at preparing the child for the more difficult tasks to follow. The two photographs which appear below depict the two-option and four-option word matching tasks.



Matching  
task  
with  
two options



Matching  
task  
with  
four options



Built-in branching (based on the child's level of performance), either to a more advanced level, to a remedial section, or simply to the beginning of the same section, puts flexibility into the program and, therefore, makes it responsive to each individual's progress. Due to the children's continuous choice of objects throughout most phases of the program and to programmed checks on their achievement, no two children underwent the same learning sequence. The speed at which each child progressed through the program was determined by his ability to satisfy criterion at various levels (usually 80% correct). With the exception of one remedial section, the program did not offer the child any "right" or "wrong" feedback. Reinforcement in this sense did not appear to be a necessary condition for motivation and learning. After receiving the child's response to a particular task, the program simply went on to the next projection. Upon completion of a sequence (see the flowchart, page 78), each child was branched according to his performance. The challenge of a more difficult task or the repeated presentation of a section may, however, have served as feedback to a number of children. Some children, therefore, may have sensed 'success' or 'failure' but, if so, only in terms of general achievement and not in terms of specific responses.

Because the child was not informed whether any one answer was correct, he could not learn to identify the correct response by remembering the "reinforced" answer. Thus the





same material remained a valid measure of the child's ability to recognize the word-referent paradigm. Regardless of how often he went through any one sequence, the only way he could reach criterion (short of the infinitesimal probability of achieving it by chance) was by realizing the nature of the task and having developed adequate word discrimination to respond correctly.

The initial phase of the program was aimed at developing the ability to match words. A second phase measured how well the child would then identify the printed word as an abstract symbol. This was done by presenting the child with slides as in the previous phase, except without the printed word. The child was then asked, for example, to "find the word on the TV screen which says ball". Depending on the level of achievement, two or four words appeared on the CRT. No other cues were offered. Moreover the child no longer had a choice as to which slides were presented. Thus he could not go through phase I repeatedly choosing the same ten words and expect to perform well in phase II. The final part of phase II presents the child with twenty slides. Following each slide, the child must identify the correct word of four which appear on the CRT. Sixteen correct responses were considered minimum for success. The flowchart (Figure 3) outlines the various learning sequences of this program.



Figure 3

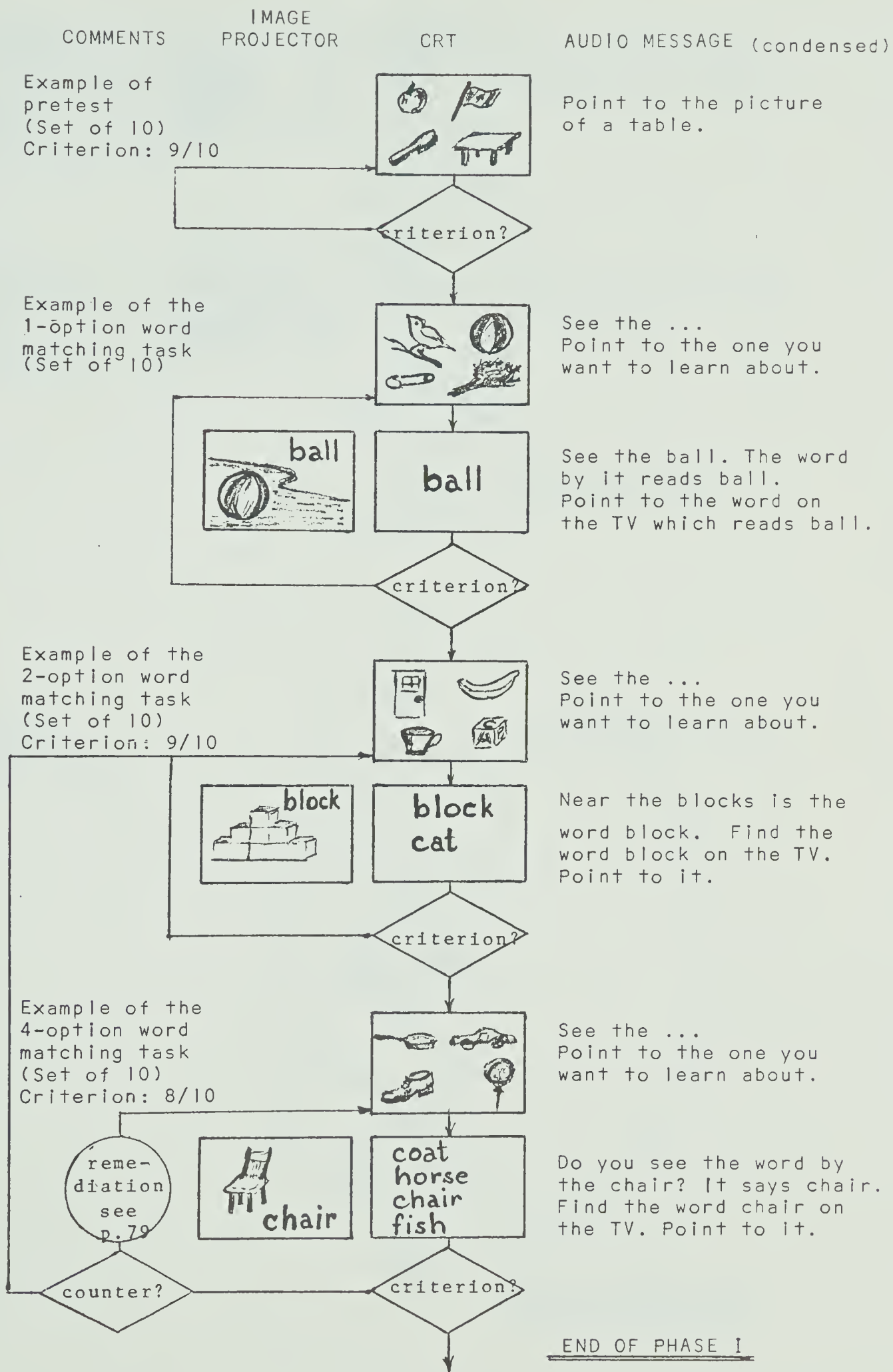




Figure 3 (cont.)

Example of  
2-option  
sight-reading  
task  
(Set of 10)  
Criterion: 8/10



banana  
ball

Point to the word on  
the TV which reads  
ball.

critrion?

Example of  
4-option  
sight-reading  
task  
(Set of 20)  
Criterion: 16/20



can  
banana  
pin  
horse

Find the word on the  
TV which reads banana.  
Point to it.

critrion?

FINISHED

END OF PHASE II

Example of  
remedial  
exercise  
(Set of 40)

hat

Read the word....  
Point to the correct  
picture.

correct?

f hat  
i  
a  
s  
h

finished?

critrion?

END OF REMEDIATION



Although the study was conducted over a four-week period, the time each child spent on the program varied from only two to a maximum of ten twenty-minute sessions. Wide discrepancies in learning rates of children were noted at all levels of the program. While differences in learning rates were noticeable even in the easier segments of phase I, these differences were even more apparent in the second phase. For most of these children the latter parts of the program were extremely difficult. The level of difficulty of the tasks was further established when it was found that three advanced first grade students who were tested on the program also were not able to complete the final tasks after a total exposure time to the program of about seventy minutes.

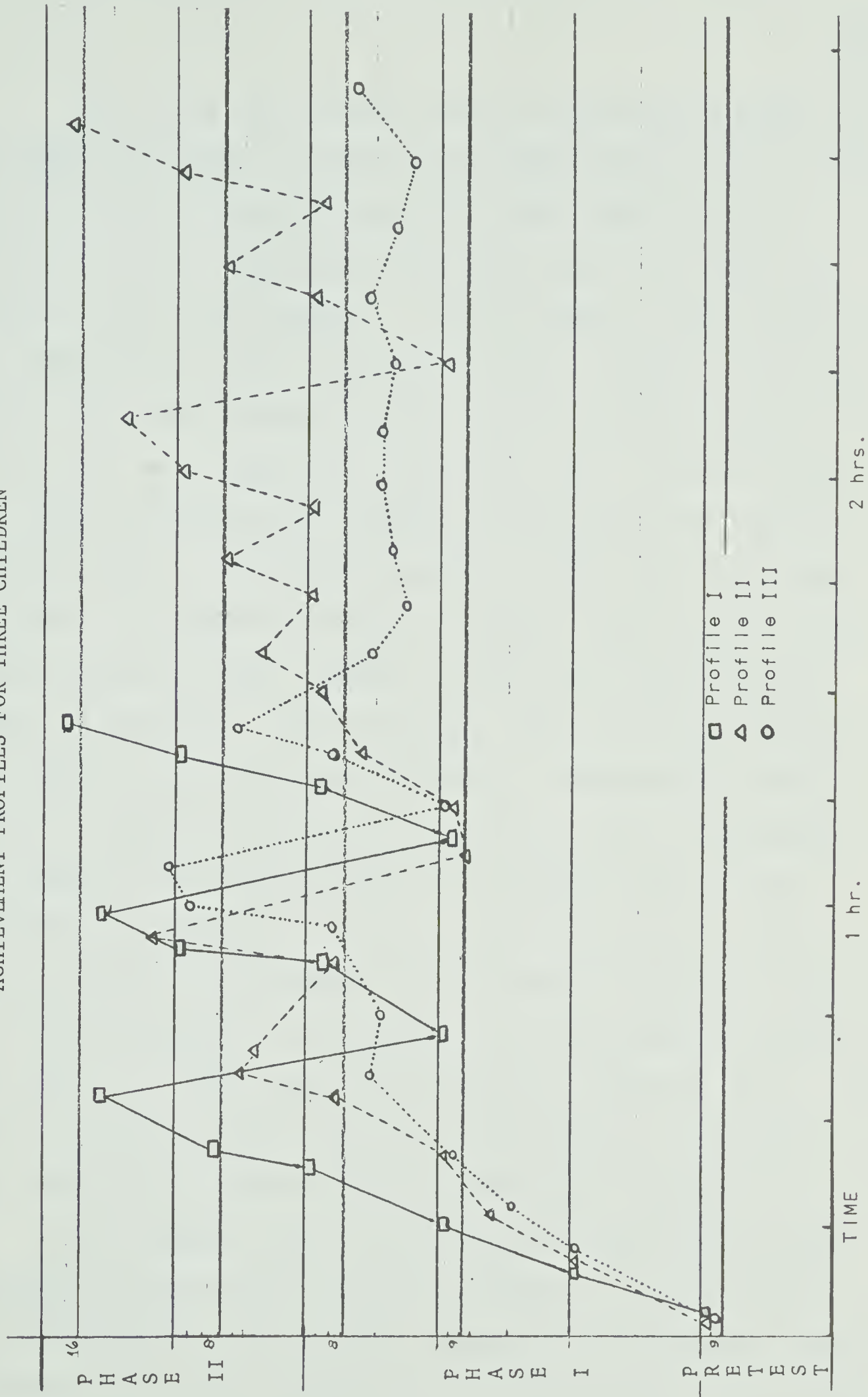
The following graph (Fig 4) indicates where the children had most trouble. Profiles I and II show the observed achievement of two children who succeeded in finishing the program. Profile III reflects the trouble a five-year-old had. After only marginal success in phase I and successive failures in phase II, the child lost interest in the program. Observed through a one-way mirror, his behavior eventually reflected complete boredom. Only when he was conscious of being observed was his performance consistent. At no time, however, was he ever able to cope with the final task demanded in phase II.





Figure 4

ACHIEVEMENT PROFILES FOR THREE CHILDREN





The other two children whose performances appear on the graph succeeded in achieving at the desired level. Profile I is the achievement path of a four-year-old girl. Twice she almost completed the course, but fell below criterion on the last sequence. The two drops in her profile are a function of the branching pattern: unable to satisfy criterion at that level, she was branched back to phase I to give her more experience with the words. As she worked her way back through the program she gained in her sight-reading skills. The second profile is that of a five-year-old girl. It took her longer to achieve final success. Her growth pattern is more typical of the group than are the other two profiles. Here again the drops in the graph are the result of the branching patterns. Whenever the child failed to reach criterion at a specific level, he repeated the segment, was branched back to an easier one, or was branched to a remedial section. The graph does not show when the child was branched to the remedial section. This part of the program is presented to a child who has trouble with phase II. Upon failing to achieve criterion at one of the two levels in this phase, the child goes through remedial instruction before being branched back to phase I.

The remedial section stresses the word-object relationship and reinforces correct responses. As is outlined in the flowchart, this section consists of a pictorial representation of a word accompanied by three objects. The child is asked to point to the correct object. Should he respond



correctly, the two distractors disappear from the screen and the remaining pair is flashed. Thus the remedial section does reinforce correct responses. An incorrect response results in the elimination of that distractor from the screen; the child is then asked to try again with only two objects to choose from. This continues until the final desired pair is flashed.

The study is progressing and alternative intermediate steps are being tested in an effort to identify a suitable series of tasks which will ensure the child's continuous development to the point where he can perform at a desired level. It is worth noting, however, that some pre-schoolers did complete all the second section of the program. This may be considered as one indication of the child's ability to recognize orthographic symbols when they are presented as words in isolation.

Aside from the progress three- and four-year-olds made in the computer-assisted learning program, equally significant was the apparent transfer ability of their newly acquired skills. Based on close observation, the matron of the nursery school which these children attend reported that a new world had been opened up to them. The picture-word relationship had become meaningful: printed words adjoining pictures in coloring books were recognized and gained meaning. They identified alphabetic characters as parts of whole words. Signs and store names became



challenging tests to their newly acquired interest. Even writing became an unusually active part of their daily activities. In the words of the matron, "every year we should have a program such as this to get children started."

### Implications

Although limited in scope, the program has demonstrated both the feasibility of promoting skills related to reading at a young age and the feasibility of using the new generation computer as an instructional device for pre-school children. Further refinement and extensions of the program mentioned above should see the presentation of even more complex materials in the area of reading. Adjectives, prepositions, verbs and short phrases are realistic extensions of this program. Children apparently can learn these tasks and, even more significant, they seem to enjoy it. Contrast this with the following reaction to the more conventional classroom situation.

Evidence shows that one of the reasons why youngsters fail is that the teacher paces instruction in the wrong way, aiming at the understanding of the average in the class. The teacher then moves on; the youngster at the lower end, not having understood the first stage, cannot understand the next stage. Finally, the cumulative effect of not understanding and not having developed the basic skills makes the youngster at the lower end so far behind that he gives up trying.

(Tyler 1969)

The solution, however, is not as simple as this study may have implied. Computer-based programs have great potential





but their effectiveness is highly dependent on the skills of the teacher-programmer to produce the required software (programs). The hardware supplied by commercial enterprises will become even more sophisticated and adaptable if good programs succeed in demonstrating their applicability.

Probing into the privacy of the living room via television offers a promise of reaching a large sector of the pre-school population while computers permit tutorized instruction. A combination of the two must be recognized as the most encouraging instructional device to hit the educational scene in recent years.

Efforts by people in education appear oriented towards modifying the classroom setting to more individualized programs of instruction, as with IPI (Individually Prescribed Instruction) and IHE (Individualized Home Economics). Without contesting the desirability of such changes, it must be argued that these alone do not solve the problem of reaching the disadvantaged child sufficiently early to permit adequate remediation.

The argument put forth in this thesis is that we must make greater efforts to develop more skills in young children of which they are obviously capable and from which they will benefit. Reading is certainly but one of the many skills and experiences we should be promoting in our three-, four-, and five-year-olds. The above program was prepared on a



computer installation in an effort to demonstrate the feasibility of using some of our newer instructional devices towards this end.

If we can meet the challenge of today, the future should see Emiles as erudite as college graduates.



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## APPENDIX



# PRETEST

| IMAGE<br>PROJECTION | CRT                     | AUDIO MESSAGE             |   |       |   |            |
|---------------------|-------------------------|---------------------------|---|-------|---|------------|
| blank               | Set of four<br>pictures | Point to the picture of.. | a | coat. |   |            |
| "                   | "                       | "                         | " | "     | " | a rabbit.  |
| "                   | "                       | "                         | " | "     | " | a fork.    |
| "                   | "                       | "                         | " | "     | " | an apple.  |
| "                   | "                       | "                         | " | "     | " | a cat.     |
| "                   | "                       | "                         | " | "     | " | a table.   |
| "                   | "                       | "                         | " | "     | " | a sock.    |
| "                   | "                       | "                         | " | "     | " | a horse.   |
| "                   | "                       | "                         | " | "     | " | a shoe.    |
| "                   | "                       | "                         | " | "     | " | a balloon. |
| "                   | "                       | "                         | " | "     | " | a bird.    |
| "                   | "                       | "                         | " | "     | " | a banana.  |
| "                   | "                       | "                         | " | "     | " | a leg.     |
| "                   | "                       | "                         | " | "     | " | a hand.    |
| "                   | "                       | "                         | " | "     | " | a brush.   |
| "                   | "                       | "                         | " | "     | " | a fish.    |
| "                   | "                       | "                         | " | "     | " | a car.     |
| "                   | "                       | "                         | " | "     | " | a flag.    |
| "                   | "                       | "                         | " | "     | " | a duck.    |
| "                   | "                       | "                         | " | "     | " | a pan.     |





## PHASE I

The same image projections are used throughout phase I. The program determines the number of printed words which appear on the CRT.

(Set 1 of 10)

| IMAGE<br>PROJECTION | CRT                     | AUDIO MESSAGE  |
|---------------------|-------------------------|--|
|                     | Set of four<br>pictures | See the bird, the key, the ball<br>and the coat?<br>Point to the one you want to<br>learn about.                 |
| bird                |                         | Here is a picture of a bird.<br>Beside it is a word.<br>It says <u>bird</u> .                                    |
|                     | word(s)                 | Can you find the word <u>bird</u> on<br>the TV screen?<br>Point to it if you can.                                |
| key                 |                         | Here are some keys on a ring.<br>Beside the picture is the word<br><u>key</u> .<br>Look at it carefully.         |
|                     | word(s)                 | Now see if you can find the<br>word <u>key</u> on the TV screen.<br>Point to <u>it</u> .                         |
| ball                |                         | Whee! What fun it is to play<br>ball.<br>See the word ball in the grass.<br>Look at the word <u>ball</u> .       |
|                     | word(s)                 | Here is the word <u>ball</u> on the TV.<br>Find it and point to it.  |
| coat                |                         | Look at the pretty girl's coat.<br>The word beside the picture<br>says ' <u>coat</u> '.<br>Look at it carefully. |
|                     | word(s)                 | Now it's your turn.<br>Point to the word coat on the TV.   |



PHASE I

(Set 2 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

On the TV is a picture of a  
rabbit, a pail, a block,  
and a banana.  
Point to the one you want to  
learn about.

---

rabbit

What a brown furry rabbit!  
In front of it is the word  
rabbit.

word(s)

See if you can find the word  
rabbit on the TV and point  
to it.

---

pail

See the boy and girl running  
with the pail!  
In the corner is the word pail.  
Look at it carefully.

word(s)

Find the word on the TV which  
also says pail.  
Point to it.

---

blocks

Look how high the boy has piled  
the blocks.  
Beside the picture is the word  
block.  
See it?

word(s)

Look on the TV screen.  
Do you see the word block?  
Point to it.

---

banana

I see you like bananas!  
The word by the picture says  
banana.  
Look at it carefully.

word(s)

Try to find the word banana on  
the TV.  
Point to it.



PHASE I

(Set 3 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

See the chair, the mitts, the  
fork, and the leg on the TV?  
Point to the one you want to  
learn more about.

---

chair

See the red chair beside the cat.  
Look carefully beside the chair.  
The word you see says chair.

word(s)

Can you find the word chair on  
the TV screen?  
See it?  
Find it and point to it.

---

mitts

Do you see the word beside the  
mitts?  
That word says mitts.  
Mitts.

word(s)

Point to the word on the TV  
screen which says mitts.

---

fork

The boy is setting the table.  
See the fork in his hand?  
Notice the word beside the pic-  
ture.  
The word says fork.

word(s)

Point to the word on the TV  
which says fork.

---

legs

One leg, two legs, three legs,  
four;  
Walking on the beach is what  
they're for.  
And here is the word. See it?  
It says legs.

word(s)

Now look at the TV screen.  
Find the word legs and point  
to it.



PHASE I

(Set 4 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures.

Do you see the bed, the cup,  
the apple, and the hand?  
Point to the one you want to  
learn about.

---

bed

Isn't this a colorful picture  
of a bed!  
Do you see the word beside the  
bed?  
It says bed. Look at it closely.

word(s)

It is your turn now.  
Find the word bed on the TV.  
Point to it.

---

cup

Look at the cup of hot coffee  
on the table!  
Beside the picture is a word.  
It says cup. See it?

word(s)

Can you find the word on the TV  
which says cup?  
Find it. Point to it.

---

apple

Somebody's been eating my apple!  
said the baby bear.  
Do you see the word beside the  
apple? It says apple.

word(s)

Do you think you can find the  
word apple on the TV?  
Point to it.

---

hand

See the little girl's hand in  
the sand?  
Look at the word beside her hand.  
It says hand. See it?

word(s)

Now see if you can point to the  
word on the TV screen which  
says hand.





PHASE I

(Set 5 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

Do you see the cat, the brush,  
the box, and the nest?  
Point to the one you want to  
learn about.

---

cat

See the little pussy cat having  
a nap!  
Sh-sh-- quiet!  
Beside him is the word cat.

word(s)

See if you can find the word  
cat on the TV.  
When you do, point to it.

---

brush

Here is a brush. A brush is  
is used for brushing hair.  
Can you see the word beside  
the brush? It says brush.

word(s)

Point to the word on the TV  
which says brush.

---

box

The man is putting toys in the  
box. Isn't it a big box?  
Can you find on the box the  
word which says box?  
Look carefully.

word(s)

Now try to find on the TV the  
same word which says box.

---

nest

Here is a robin's nest.  
Beside the nest is a word.  
The word says nest.

word(s)

Can you find the word nest on  
the TV?  
Point to it if you can.



PHASE I

(Set 6 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

Look on the TV, there is a fish,  
a pin, a can, and a table.  
Point to one of them.

---

fish

Oh...look at the fish splashing  
in the water. Can you find  
the word which says fish?  
Look closely, it is beside the  
picture.

word(s)

Now it is hiding on the TV...  
or is it? Can you find it?  
If you can, point to it.

---

pin

Look at the pins on the baby  
diapers. One is open, one  
is closed. Now try to find  
the word which says pin.  
It is beside the picture. See it?

word(s)

Here it is again on the TV.  
Find it and point to it.

---

can

What a dirty can of paint!  
There is red paint all over it.  
See the word beside the can?  
It says can.

word(s)

Here is the word can on the TV.  
See it? Now point to it.

---

table

Isn't it fun to work at a table?  
Look under the table. Do you  
see the word? It says table.

word(s)

Now it's hiding on the TV. Or  
is it? Can you find it?  
If you can, point to it.



PHASE I

(Set 7 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

See the pictures on the TV?  
There is a car, a sock, a hat,  
and eggs in a nest.  
Point to the one you want to  
learn more about.

---

car

The street is full of cars.  
Can you find the word in the  
picture which says car?  
Look at it carefully.

word(s)

Now find the word car on the TV.  
Point to it.

---

sock

A sock is worn on a foot.  
Beside the sock is a word.  
It says sock. See it?

word(s)

Look at the TV. Try and find  
the word sock.  
When you do point to it.

---

hat

What is the jolly man wearing  
on his head? It is a hat.  
Look at the word beside the  
picture. It says hat.

word(s)

Now look at the TV. Can you  
find the word which says hat?  
Point to it.

---

eggs

See the mother chicken and her  
eggs. Let's learn about eggs.  
The word beside the picture  
says eggs. See it?

word(s)

Here is the word eggs on the TV.  
Can you find it?  
Point to it.



PHASE I

(Set 8 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

On the TV are four pictures: a  
horse, a pipe, a spoon, and a  
flag. Point to one of them.

---

horse

See the mother horse and her  
baby. Beside them is a word.  
It says horse.

word(s)

Look at the TV. Try and find  
the word horse.  
When you do, point to it.

---

pipe

In the bright orange ashtray  
is a pipe.  
Do you see the pipe? Now try to  
find the word which says pipe.  
Find it? Look carefully.

word(s)

Now it's hidden on the TV.  
Find it and point to it.

---

spoon

The mother is giving the girl  
a spoonful of medicin.  
See the spoon? Beside the pic-  
ture is a word.  
It says spoon.

word(s)

See if you can find the word  
on TV which says spoon.

---

flag

Over the wagon is a bright red  
flag. If you look carefully  
you will find a word.  
It says flag.

word(s)

Here is the word on the TV.  
Find it and point to it.





PHASE I

(Set 9 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

Do you see the door, the duck,  
the pen, and the shoe on  
the TV?  
Point to one of them.

---

door

Is that the door to your house?  
No? Look beside the door,  
there is a word.  
It says door. See it?

word(s)

See if you can find the word  
door on the TV.  
If you can, point to it.

---

duck

The big white duck is looking  
for something. Maybe it  
is the word. You can see  
it but he can't.  
It says duck.

word(s)

See if you can find the word  
duck on the TV.  
When you do point to it.

---

pen

Can you write with a pen?  
Try to find the word pen. See it?

word(s)

Now it is hiding on the TV.  
Find it and point to it.

---

shoe

The little girl is tying her  
red shoe. The word beside  
the picture says shoe.  
Look at it carefully.

word(s)

Now see if you can find the  
word shoe on the TV.



PHASE I

(Set 10 of 10)

IMAGE  
PROJECTION

CRT

AUDIO MESSAGE

Set of four  
pictures

See the balloon, the pig, the  
pan, and the book?  
Point to the one you want to  
learn more about.

---

balloon

What a beautiful red balloon!  
The word balloon is near the  
boy's feet.  
Look at it closely.

word(s)

Here it is again on the TV screen.  
Find it and point to it.

---

pig

Isn't that a big fat pig?  
With his nose he can dig.  
Beside him is a word.  
It says pig.

word(s)

Now look at the TV screen. Find  
the word pig and point to it.

---

pan

See the lady holding the pan?  
The word beside the picture  
says pan. Do you see it?

word(s)

Find the word on the TV which  
says pan. Now point to it.

---

book

Hey! Look at all the books!  
The word you see beside the  
picture says book.  
See it? Book.

word(s)

Here it is again on the TV  
screen.  
Find the word book and point  
to it.



## PHASE II

| IMAGE<br>PROJECTION | CRT       | AUDIO MESSAGE   |
|---------------------|-----------|---|
| balloon             | 2/4 words | Here is the picture of the red<br>balloon.<br>But there is no word on the picture.<br>The word <u>balloon</u> is on the TV Screen.<br>Find it. Point to it. |
| pen                 | "         | Now you see the pen!<br>Can you find the word which says <u>pen</u> ?<br>It is on the TV. Point to it.  |
| horse               | "         | Here are the horses.<br>Find the word on the TV which says<br><u>horse</u> . Point to it.   |
| hat                 | "         | The joly man with the hat!<br>The word <u>hat</u> is not on the picture.<br>Can you find it on the TV?<br>Point to it.                                      |
| table               | "         | Here is the table.<br>Now find the word on the TV which<br>says <u>table</u> . Point to it.   |
| cat                 | "         | The pussy cat is still having a nap!<br>Can you find the word <u>cat</u> on the TV?<br>Point to it.   |
| apple               | "         | Now you see an apple.<br>Find the word <u>apple</u> . Point to it.  |
| chair               | "         | Here is the chair.<br>Point to the word <u>chair</u> on the TV.   |
| banana              | "         | Now you see a banana.<br>Find the word <u>banana</u> on the TV.<br>Point to it.   |
| ball                | "         | See the ball?<br>Find the word <u>ball</u> on the TV.<br>Point to it.   |
| coat                | "         | Here is the picture of a coat.<br>Point to the word on the TV which<br>says <u>coat</u> .   |



## PHASE II (continued)

| IMAGE<br>PROJECTION | CRT       | AUDIO MESSAGE                        |
|---------------------|-----------|--------------------------------------|
| rabbit              | 2/4 words | Point to the word which says rabbit. |
| leg                 | "         | " " " " " "                          |
| hand                | "         | " " " " " "                          |
| box                 | "         | " " " " " "                          |
| pin                 | "         | " " " " " "                          |
| sock                | "         | " " " " " "                          |
| pipe                | "         | " " " " " "                          |
| shoe                | "         | " " " " " "                          |
| book                | "         | " " " " " "                          |











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